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THE SCENERY OF CUBA, HISPANIOLA (HAITI), AND JAMAICA.*

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The island of Cuba—44,000 square miles in area—is truly remarkable for the scenic beauty of its landscapes, its tropical vegetation and bird-life, and the historical interest and architectural features of its old Spanish towns and fortresses. Its winter climate comes very near perfection. A painter will wax enthusiastic over Cuban colour—the painted houses of the Spanish towns; the women's dresses; the gorgeous flowering trees and shrubs; the brilliant green sugar-cane with its delicate mauve-grey blossom; the plumage of Cuban trogons, parrots, cuckoos, kestrels, and starlings; the white, columnar stems of the royal palms; and the unrivalled sunsets. The botanist, ornithologist, anthropologist, and butterfly collector will find material for months of fascinating study.

Havana is probably the most picturesque city in America, not even excepting Cartagena, on the north coast of Colombia; and Cartagena, like Havana, Santiago, and other Cuban and Spanish-American towns, is beautiful enough in colour and form to provoke a special school of painters, if landscape painting were not nearly dead under the advancement of photography. The harbour of Havana is entered by a deep, narrow strait, commanded by the frowning forts of the Morro and Cabañas. This strait widens abruptly into a magnificent basin; but the sea-front of Havana and the approach through the natural canal irresistibly recall Venice—an illusion further fostered by the somewhat gondola-like appearance of the "guadaños," the boats with awnings which ply to and fro over the green water. Curiously enough, the most striking public building of Havana, and that which with the dome reminds one of Santa Maria della Salute at Venice, is a quite recent

* Read at the Royal Geographical Society, April 5, 1909. Map, p. 740.

addition of the Americans—the "Lonja de los Viveres" (Produce Exchange). It is difficult to believe that a few years ago this most splendid building of all Havana did not exist. Nowadays it is the heading-up of the city, placed with an appreciation of scenic effect so distinguished, as, from our conventional point of view, to be more characteristic of France than of the United States. But those who have seen twentieth-century New York, Boston, Washington, and Philadelphia should realize that in splendour and originality of architectural genius North America is now leading the world.

The American occupation also endowed Havana with its noble esplanade or marine drive, which from the end of the Prado and the low promontory of La Punta (opposite the Morro fort) extends for three or four miles along the sea-coast past the pretty western suburbs of Havana. The same agency has furnished Havana with banks, hospitals, and markets. The streets, narrow and broad, have been paved or asphalted so that their surface is invariably clean; the water-supply has been repaired and extended; the mosquito and the flea, with the disappearance of their breeding-grounds, have been eradicated: the result being that Havana is now an absolutely healthy town, and from some points of view an ideal place of residence. The Spanish beauty of the city has been left undisturbed, and it is very marked. Most of the old houses present a plain aspect to the street front (except for the beautiful ironwork of the long window grilles), but the arched entrances of the passages, when the massive outer doors are opened, reveal enchanting *patios* of tropical vegetation, fountains, bright plumaged parrots and gaily caparisoned mules or horses. Many of the streets have massive colonnades along one side, in the shade of which a great variety of shops display their wares. The other side of the medal is the much increased cost of living which has prevailed since the American occupation. The dearness of comfortable living in Havana and most other Cuban towns is the only deterrent which can be quoted—besides the sea voyage—to explain why Cuba should not be the principal winter resort of civilized America.

The railways of Cuba are owned and worked by several American, British, and Canadian companies. They extend eastwards from Havana to Guantánamo, zigzag across the island from north coast to south coast, and penetrate also from Havana into the western part of the island, and towards that Isle of Pines which is practically the private property of a few rich Americans and one of the many earthly paradises of the Antilles.

The dominant note in the scenery of Cuba is certainly struck by the royal palm (*Oreodoxa regia*). This is possibly the most beautiful and stately member of a princely order of plants. It is especially characteristic of Cuba, for although found also (sparingly) in Hispaniola and in Porto Rico, it is not native to the other Antilles or to tropical

CEREUS CACTI, EASTERN CUBA.

AN AVENUE OF ROYAL PALMS, CUBA.

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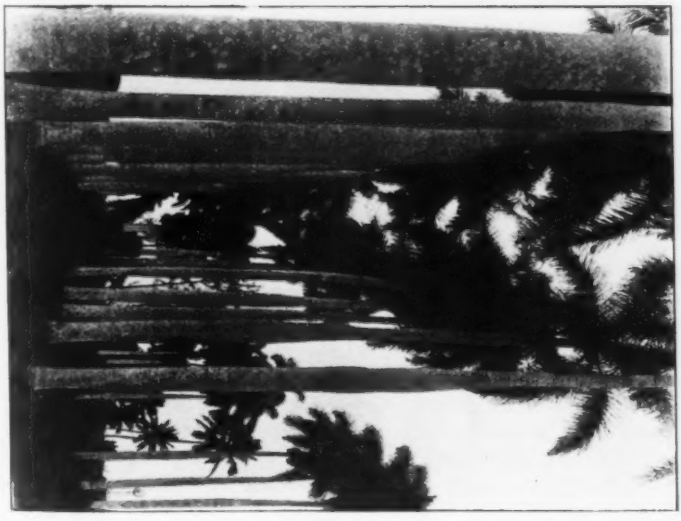


AN AVENUE OF ROYAL PALMS, CUBA.

America. It has been so widely introduced into the other West India islands and Brazil that its area of distribution appears at first to be much larger than it really is. But it grows nowhere with such stateliness as in Cuba. The *O. oloracea* or "cabbage palm" of Jamaica is a near relation, but of humbler appearance. The stems of the royal palms are absolutely smooth, rounded like columns, and a uniform grey-white. The fronds as they wither fall off cleanly, leaving no perceptible roughness or scar; the result is that a row of royal palms looks like a colonnade of white marble pillars crowned with a copious but neatly arranged *gerbe* of glossy green fronds. The greenish—and when ripe, creamy white—blossoms (followed by small, shining, reddish fruit) grow out with prim neatness below the sheaf of fronds, just where the white marble column of the stem changes, without transition of tint, into the smooth emerald green midribs of the ascending plumes of the fronds. The royal palm is a fastidiously beautiful thing. We shall yet find the location of the vegetable soul; and we shall then know that *Oreodoxa* is as self-conscious and proud of its appearance as the peacock or the lifeguardsman.

Nearly every residence or even farmstead in Cuba is approached by an avenue of royal palms, and although they do not precisely grow in forests, still the royal palms permeate Cuba with their stately influence, redeeming the landscapes from any meanness, even where industrialism has aimed at substituting the prosperous sameness of sugar-cane, cotton, or tobacco for the variegated colour and outline of forest, bamboo thicket, and prairie. Other noteworthy features in the landscapes of the plains and foothills are the brakes of glaucous green palmetto (*Sabal*) and clumps or actual forests of two other types of fan-palm, belonging to the genera *Coccothrinax* and *Thrinax*. The *Coccothrinax* palms grow to a fair height—40 or 50 feet—with smooth, round, grey stems. *Thrinax* is a much smaller palm with a very slender, perpendicular stem crowned by a great mop-head of grey-green fan-fronds. Both *Coccothrinax* and *Thrinax* are distinguished from *Sabal* (the familiar palmetto of the Southern States) by their smooth stems, whereas the palmetto retains the dead frond stalks as a defensive *chevaux-de-frise* from the base of the trunk to the growing fronds. All three are singularly handsome trees with what might be called an "architectural" beauty.

Huge bamboos (besides dwarf species) grow all over Cuba. The smaller bamboos of the genus *Arenaria* (similar to those of the Southern States) are obviously indigenous, as in Haiti. But a good many botanists maintain that the tall bamboos of Cuba, Haiti, and Jamaica, Trinidad, and other West Indian islands are of an introduced East Indian species. If so, this imported bamboo has spread everywhere in these lands till it has become an essential—and very beautiful—feature in the scenery.

An indigenous plant which arrests one's attention in Cuba from its striking appearance is the cycad, which grows so commonly by the roadside or at the thresholds of the cottages, no doubt planted by the natives for its handsome appearance.

Above 2000 feet (ordinarily) the Georgian pine makes its appearance, where it has not already been destroyed by reckless wood-cutting under the Spanish *régime*. In the Island of Pines this handsome and valuable conifer grows as low down as 500 feet altitude above sea-level.

Where the land has not been cleared for plantations, or its elevation (above 3000 or 4000 feet) does not induce a temperate climate, the surface of Cuba is still clothed with dense tropical forest, in which the Cuban mahogany and ebony trees and a good many examples of the flora of Central America are met with. These forests mostly linger in east-central and eastern Cuba. They are being somewhat ruthlessly cut down by lumber concessionnaires. The Government of the Cuban Republic is not yet sufficiently awake to the importance of preserving forests in due measure for the climate and the amenities of scenery. There is a feature in the Cuban woodland which at once attracts the attention of the tourist coming from the north, and new to the American tropics, namely, the large number of ærophytic or epiphytic growths on the branches and trunks of big trees. These consist of lizard-like fig trees, which eventually strangle their host; of members of the pine-apple family (*Bromeliaceæ*); of cacti, aroids, orchids, and ferns. In Cuba the commonest growth on the trees is a pretty aloe-like *Tillandsia*, with a spike of reddish-yellow buds, disappointing in that they barely open their petals.

This epiphytic growth begins in the forests of the Southern States in the form of the celebrated "Spanish moss." Few people seem to be aware that this extraordinary growth is not a "moss" or a lichen, but belongs to a genus (*Tillandsia*) of the pineapple family! It is one of Nature's best jokes, for on the opposite side of the Atlantic, in Africa, we have a real lichen—*Usnea*, "old man's beard"—which grows as a parasite on trees in the upland forests exactly in the fashion and with precisely the same colour and general appearance as the *Tillandsia usneoides* of the United States, Cuba, and the elevated regions of the Antilles and Central America. But *Tillandsia* betrays itself as a phanerogam and monocotyledon by its small blue flowers like those of the pineapple.

The moister climate of the Antilles makes them less suited to cactus growth than the arid regions of the United States and of Mexico. Still cacti enter considerably, and picturesquely, into the scenery of eastern Cuba, especially on sandy flats, which are the recently raised beds of former estuaries or lakes. Here the tall cacti, especially of the genus *Cereus*, offer a striking parallel in appearance and *rôle* to the African euphorbias. Like them they rise up out of the barren, sun-smitten

waste, and serve as a shelter and a nucleus for other vegetation, thus in time creating oases of forest.

The rivers of Cuba, though seldom offering much facilities of navigation (except, perhaps, the case of the Rio Cauto of eastern Cuba, which has a navigable course inland from its mouth of about 40 miles for small boats), are remarkable from the point of view of scenery. Their upper courses are a succession of boiling rapids and snowy falls, as they tear down through the splendid forest of the hills and plateaus. The bed of each river (away from the alluvial plains) being usually bare limestone, the colour of the water is a lovely greenish-blue. Sometimes they flow over a long series of abrupt steps in the rocks, exactly like the formal descents of artificial cascades. When they have reached sea-level they meander through swampy forests of South American luxuriance, or create vast swamps which are jungles of reeds, rushes, and "water-hyacinths," and the home of countless herons, tree-ducks, pelicans, darters, rails, and jaçanás. The south coast of Cuba, away from the eastern prolongation, possesses more swamp lands of great extent than the northern part of the island. Zapata swamp, in the south of Cuba, is over 2000 square miles in area. This region is, or was, the breeding-ground of myriads of white herons (egrets); and here, in spite of native and American gunners, urged on a career of abomination by the misplaced taste of forty millions of unthinking American and European women, the beautiful white *Ardea egretta* is sufficiently numerous to be quite a feature in the landscape. In the swamps and river estuaries of Cuba there are two species of crocodile—*C. rhombifer* (peculiar to Cuba) and the widespread *C. americanus* (*acutus*). In spite of the loose statements of writers, I believe there is no *alligator* and no *caiman* in any West Indian island.

Cuba, Hispaniola (Haiti), Porto Rico, and Jamaica (besides the Bahamas, Virgin islands, the northern Leeward islands, and Barbados) are entirely without poisonous snakes. In Cuba, Haiti and Jamaica (the southern Bahama islands also) there are tree boas of the genus *Epicrates*, and a genus of the water-loving boas, *Ungalia;* there are no snakes, however, of the genus *Boa*. Cuba shares with Hispaniola and the rest of the West India islands colubrine snakes of the genera *Dromicus* and *Liophis*, and with Central America (but not with the other Antilles) a colubrine of the genus *Urotheca*. It also possesses a colubrine genus absolutely peculiar to itself—*Arrhyton*. Whilst on the subject of snakes in the West Indies, it might be mentioned that Hispaniola has *two* peculiar genera of colubrine snakes—*Uromacer* and *Hypsirhyncus*—so far not found anywhere else; Jamaica has no peculiar genus and has fewer species of snakes than Hispaniola and Cuba, but more than Porto Rico or the northern Lesser Antilles; and, finally, that in their serpent fauna the southern groups of the Lesser Antilles (Guadaloupe to Trinidad) are more "continental" and South American than is the case with the

Greater Antilles. These last, be it noted, are absolutely unconnected in the affinities of their reptilian fauna with Florida and North America, but offer some relationship to southern Mexico and Central America. These indications as to past land connections or approximations are further borne out by plant, bird, spider, fish, and mammal distribution, showing that the Greater Antilles have had no nearer neighbourhood with the *North* American continent since the middle of the Secondary epoch (if then); that their least ancient land connection (? early Tertiary) has been with Central and not South America; and, finally, that they to some extent shared with Tropical America a connection with or approximation to West Africa perhaps as late as the beginning of the Tertiary epoch. An interesting relic of such a connection is the rare insectivore of the genus *Solenodon*, found in Cuba and Hispaniola. The nearest living relations of the *Solenodon* are probably the tenrecs of the *Centetes* genus in Madagascar. The *Solenodon* (*S. cubanus*) was discovered in Cuba in 1835 (*S. paradoxus* perhaps earlier in Haiti); its native name in Cuba is *almiquí*. It is now extremely rare, and may be restricted to the wild mountain country of eastern Cuba, although it was still recently met with in the west. There are about twenty genera of bats represented in the indigenous fauna of Cuba, Haiti, and Jamaica, only one of which is of North American affinities, three being peculiar to the Greater Antilles and the remainder Central American. The manati still visits the coasts of Cuba and Hispaniola, though it seems to have vanished from the fauna of Jamaica. The only other indigenous terrestrial mammals in these three islands are rodents of the Octodont type—three species of *Capromys* in Cuba and one in Jamaica, and a single species of *Plagiodon* (*P. ædium*) in Haiti and Jamaica. A *Capromys* is also found on the little Swan island,* between the coasts of Jamaica and British Honduras. The Cuban name for the *Capromys* rodents is *Hutia*. It is not true that there is any aguti in Cuba or the other Great Antillea. There is a nearly extinct aguti lingering in some of the Lesser Antilles south of the dividing line—the Antigua channel—which can be equally well a vestige of former land connection with South America or a creature introduced by the Arawak or Carib seafaring colonists.

In Cuba, as in Hispaniola, the domestic pig has run wild, and developed into a lean, long-legged, miniature wild boar. The forests, moreover, of Cuba and of Haiti are full of deer. These I found to be simply roebuck, with, in the male, rather fine antlers. I also saw in Cuba (semi-domesticated) North American deer from Florida or Louisiana, or brocket deer from Venezuela. But the roe is the prevailing type, and is commonest in the mountainous districts of the east. The history of this introduction is that the French first of all brought the roe from France to Martinique; then, as they throve there, the roe deer were carried on to Haiti and San Domingo, whence the French (for there have been many

* Named after Captain Swan, the buccaneer.

THE HUT OF AN "INDIO" (A CUBAN OF AMERINDIAN RACE).

IN PORT AU PRINCE, HAITI.

French planters in Cuba under the Spanish *régime*) or Spanish introduced them into Cuba. Venison from the roe is now an important item in Cuban dietary.

Sir Sydney Olivier, the Governor of Jamaica, informs me that peacocks were a long while ago, with guinea-fowl, introduced into Antigua and other of the Lesser Antillean islands, with the result now that peafowl populate the scrub of these islands, and are a source of revenue to the inhabitants. Peacocks are abundant as domestic birds in Haiti. It is surprising they are not kept also in Jamaica and Cuba.

Of course, the right and proper thing to do in the Greater Antilles would be to populate the wastes and woods, not with the birds and beasts of Europe, Asia, and Africa, but with those of Central and South America—to finish the task that Nature heedlessly left unfinished. The magnificent ocellated turkey of British Honduras should be introduced in large numbers into Jamaica, Cuba, and Hispaniola; jaguars should be placed in small game reserves; tapirs be encouraged to roam where they willed; the roe deer should be replaced by the South American red brocket; and a discreet selection of American monkeys and macaws be given a new lease of existence in the Antillean forests.

As it is, Cuba and Jamaica possess the material for some very lovely national parks and bird reserves in the partially land-enclosed, islet-studded lagoons and gulfs along the north-east and south-west coasts of Cuba and the south coast of Jamaica. Here there are already wonderful sea gardens where, as in a huge aquarium, may be studied the life-history of sponges, anemones, crinoids, polyps, and strange crustaceans; where the tourist may gaze fascinated from the clean coral rocks at the marvellously coloured fish of the West Indian sheltered waters. In the air above, frigate birds, phaetons, and gannets are wheeling and poising; on the still waters there are many pelicans and flamingo; indeed, the boldly marked dark-grey, white, and lemon-tinted *Pelicanus fuscus* is very tame, and delights to perch in a spirit of Japanese art on the fishing-stakes or navigation beacons. Birds form a very prominent element still in Cuban, Haitian, and Jamaican landscapes, though, unless strict measures be taken by the respective governments, the trade in feathers and the rush of ignorant, slaughter-loving tourists will soon eradicate this beautiful element in Antillean life. The parrots in all these islands are becoming scarce—the Jamaican macaw is practically extinct—but the little green todies (with crimson breasts) are still as tame as robins, and the humming-birds will continue to buzz round the blossoms until they are finally extinguished by the plumage-hunters. It is supposed that Cuba possesses the smallest humming-bird in the world—*Calypte helenæ* (named after Princess Christian); but it may have a rival in tininess in a Peruvian species of *Acestrura*. The *Calypte helenæ* is an exquisite little creature not quite 2½ inches long with a forked crimson gorget. Its nearest relations are in southern California.

No one visiting the forests of eastern Cuba can readily forget his first sight of the trogon peculiar to Cuba—the *Prionotelus temnurus*. It is not difficult to watch it at close quarters in its favourite resorts, sitting on a bough with upturned head, displaying its white shirt-front and gorgeous crimson scarlet stomach, and uttering at intervals a low and singularly musical cry. The Cubans call it tocoloro.

Other prominent birds in the Cuban landscapes are the bold *Polyborus* hawks (*P. cheriway*) stalking about after their prey like the African secretary bird (the *Polyborus* type is not found in Hispaniola or Jamaica, and possibly reached Cuba from Florida); the prettily coloured kestrels (found also in Hispaniola) of vivid orange-chestnut, dove-grey, and black barrings; the very numerous black cuckoos (*Crotophaga*) with parrot beaks; and the Turkey buzzards (*Cathartes aura*). These last are only found in Cuba, the Bahamas, and Jamaica; not in Hispaniola. Though written of disparagingly by so many writers, this scavenger is a very handsome bird with its bright-red head and neck, glossy black and sepia general plumage, and satiny grey-white under-side to the great wings which it wields so majestically. The turkey buzzard is the most abundant bird in Jamaica.

The human inhabitants of Cuba consist of 609,000 Negroes or negroids, about 200,000 pure-blood Spaniards (mostly of quite recent immigration), some 20,000 Americans, British, Germans, Italians, and French, 2000 Chinese, and some 1,200,000 Spanish-speaking Cubans, who obviously contain a very considerable degree of Amerindian-Arawak intermixture. Although the "Indian" aborigines of Cuba became officially extinct in the middle of the sixteenth century, it is obvious (to me) that their extermination was in no way so complete as Spanish and Anglo-Saxon historians have asserted. By adopting under cruel compulsion the Christian religion, they became merged in the Spanish community and henceforth were ranked as Spanish. As half-breeds—almost as pure breeds—they linger to this day, especially in eastern Cuba. It is, indeed, authoritatively asserted that pure-blood Amerindians remained in the mountains of eastern Cuba down to the early part of the nineteenth century. I have seen "Indian" reservations of land which were only finally broken up and thrown open to general settlement (mainly by Indian half-breeds) by the Spanish Government forty years ago.

The dwellings of the Cuban peasantry are very picturesque if slightly tumble-down. An invariable feature in every household where there is a man is the gamecock. The Cubans are passionately fond of cock-fighting, and although the Americans have tried to suppress this (they have completely done away with bull-fights), they have not succeeded. The beautiful game-fowl bred for this sport are certainly a further episode of picturesqueness in Cuban life—as are the magnificent long-horned cattle, the gaily caparisoned mules, and the barb riding-horses.

The great landed proprietors—Spaniards in the past, now mainly

Americans—dwell often in marble palaces near their sugar plantations, which recall the most sumptuous dwellings of Andalusia. What a beautiful thing is the lush growth of the tall sugar-cane—the brightest emerald green, flecked with plumes of mauve-grey blossom!

Not one of the old Spanish towns of Cuba but is a source of inspiration to a painter. Let me cite two examples: Camagüey in the north-centre, and Santiago-de-Cuba in the south-east. Camagüey is nearly four hundred years old as a Spanish city, but it was a place of Indian settlement for a long antecedent period. It is the "all white" town where the sixty thousand inhabitants are for the most part of pure Spanish descent, and the handsomest people in Cuba. No town in Spain is more "Spanish" or more picturesque, with its narrow streets, projecting balconies screened by carved wood or iron grilles, tiled roofs, thick walls, *patios* glowing with sunlit vegetation, its sixteenth and seventeenth century cathedral, churches, chapels, monasteries, and convents. The steeples and doorways of some of these churches (and of a good many Cuban buildings generally) almost suggest the Moorish influence in architecture which prevailed in Southern Spain down to the period of Columbus's voyage. Several of the ecclesiastical buildings of Camagüey contain magnificent altar-pieces and shrines of hammered silver.

In Santiago, the eastern capital of Cuba, and now one of the most beautiful places in the world, the solidly constructed houses (the Spaniards, among many great qualities, had that of building appropriately and permanently) were painted in tempera almost every attainable tint, combined with white copings, window-frames, doorways, parapets, and skirtings. One house is ultramarine blue (and white), another dull mauve (and white), or pale green, maize-yellow, pink, terra-cotta, sky-blue, greenish-blue, apricot, grey-brown. The effect, combined with the fronds of palm trees and bananas, the dense foliage of figs, ilexes, mimosas, orange trees, and giant laurels, the brilliant flowers of bushes and creepers, the brown-red tiled roofs, the marble seats and monuments, the graceful balconies, the white stone colonnades, the blue waters of the harbour, and the magnificent encircling mountains, was daring, but eminently successful. One might undergo at Santiago de Cuba a colour cure for melancholia. But in pre-American days the streets were utterly neglected and the drains stank (as was also the case in all other Cuban towns). There was either a pavement of rough cobble stones, with a filthy stinking gutter on either side, or there was no pavement at all—merely the dust, mud, and rock of the pristine pathway. The city was almost impassable for carriages; rough carts groaned and rattled over its uneven surfaces.

The Americans, represented by a deputy or provisional governor, changed all that. The steep streets were asphalted, tram-lines were laid along the principal thoroughfares, and neat side walks of stone or brick were constructed, while at the same time a modern system of

drainage was created. The cool grey or white of the asphalt, stone, or encaustic brick is an admirable accompaniment to the riot of colour above and around; the town is odourless, save for the scent of flowers, and its streets are accessible to all types of carriages; while poor people can for five cents travel this way and that, across the town and out into the country in pretty little electric tramcars proportioned and painted to suit the narrow streets and gay colours of this fairy-tale city.

In the proximity of Santiago are the highest mountain ranges of Cuba,* and the scenery on the extreme east of the island, round about Guantánamo, is of exceptional beauty and interest.†

I said good-bye to Cuba under a sunset of crimson and gold, a reminder of the old Spanish colours which eleven years ago were still waving over the island—the red and yellow that the Cubans might well have retained (with a different device) in their national flag instead of the inept red, white, and blue, which two-thirds of the world now adopt, without reason, as national colours.

After a rough passage across the 60 or 70 miles of strait between the two islands, Haiti received me in the blue and silver of placid water girdled with lofty ranges of mountains wreathed or crowned with white clouds. The open arms of Haiti are two peninsulas of alpine heights that enclose a vast gulf of sheltered sea screened from rough winds and vexing currents. Nearly in the middle of the Gulf of Haiti arises, to over 2000 feet, the large island of Gonave, purple with woodland or scrub, green with crops, and slashed here and there with squares of red clay or the gleaming yellow-white of the underlying limestone. This island affords further protection from such winds as are not sufficiently broken by the sierras of Haiti (7000 to nearly 9000 feet high) or by the lofty ranges of eastern Cuba. So that the Gulf of Haiti, and most of all its easternmost half, would make the safest and amplest naval station in the world. A million years ago (or less) the great southern peninsula of Haiti and the south-westernmost portion of San Domingo were a long mountainous island, cut off from the rest of Haiti by a narrow strait connecting the Gulf of Gonave with the Bay of Neiba. At the present day the fiord is dry land for more than half its surface, and enclosed water (salt and fresh water lakes) for the remainder.

Port-au-Prince, the capital of Haiti, is placed near the south-westernmost edge of this isthmian plain, the *cul-de-sac* of the old French colonists (just where the last spurs of the southernmost mountains descend into the inland sea). In daylight, viewed from steamer deck in

* The Pico Turquino of the Sierra Maestra range is about 8400 feet in altitude. It has once been ascended by a British consul. As it and the other high peaks of the Sierra Maestra rise up from the actual seashore, their appearance is very grand.

† Before quitting the subject of Cuba, I should like to acknowledge here the assistance and hospitality I received from Mr. Theodore Brooks, of Guantánamo.

THE SHORES OF LAKE AYULY, HAITI.

IN THE OPEN MARKET, HAITI.

the outer harbour, it does not present a poor appearance. This is largely due to the magnificent new cathedral, which is placed just where such a building should be situated to give a focus to the town. Without this cathedral (of French design and Belgian construction), Port-au-Prince, two or three years ago, must have presented a somewhat paltry appearance for a great capital city. The other notable buildings are seldom remarkable for stateliness of design or prominence of position, though there are some handsome churches. On the left-hand side of the town is a low promontory, or jetty, composed chiefly of mangrove mud-banks and stranded, rusting, paddle-wheel steamers. This spit of land culminates seaward in a low lighthouse surrounded by a battlemented fort. Far to the right are more low mangrove islets, but behind the actual shore-line the land rises rapidly into green highlands, studded with fantastic palaces, and the highlands enlarge into mountains of almost Alpine character. On the sky ridges of these may be seen from the shipping in a harbour of intense tropical heat the silhouettes of the tall pine trees, which indicate a land of cool, invigorating temperature within half a day's climb.

I first saw Port-au-Prince in the late evening, and the effect, after the brilliant variegated lighting of Cuban and American towns, was disheartening. We might have been approaching some sullen, pirate capital of Haiti two hundred and fifty years ago, desirous of offering no attraction or assistance to the inquiring stranger. A few dull yellow lights blinked from the dense foliage of the suburb. Here and there a glowing red lamp seemed to indicate danger. Although Port-au-Prince, with its suburbs, is a city of 104,000 inhabitants, and is the capital of an independent state of nearly 12,000 square miles in area, it possesses no system of public illumination.

When one lands here in the morning (steamers may not communicate with the shore after sunset) the impression is less unfavourable, though docks and wharves are absolutely non-existent, and landing from or boarding the steamer means a long and weary row. But it is obvious that Port-au-Prince—thanks to German, American, and Haitian enterprise—has made considerable strides of late towards the amenities of life. It is true that in dry weather the streets near the seaside are occasionally intolerable with their clouds of malodorous dust, that there is no continuous side walk along any of the streets, and that, with the exception of about half a mile of recently macadamized roadway, the paving of the streets is monstrous in its grotesque imperfections. But the houses are by no means uncomely, nor is the town nearly so dirty as it was described by various writers down to the year 1900. Either they exaggerated, or their criticisms stirred up the civic authorities of Port-au-Prince to effect considerable improvements in the cleanliness of the streets.

A welcome surprise which greets the visitor to Port-au-Prince who

arrives from any other part of America, not excepting Jamaica and the other British West India islands, is the far greater cheapness of living. The President's palace, situated with its surrounding garden on one corner of the extensive Champ de Mars, is a turreted, verandahed erection, apparently roofed and faced with corrugated iron, or with some cold grey glistening metal. But the general appearance is not unpleasing, though a little "baroque," especially when in times of festivity it is extravagantly decorated with the blue and red Haitian colours. But the so-called garden which surrounds it is a dreary trampled waste perpetually paraded by soldiers. Not far away is the range of Government offices, all in one building. In front of this, painted a gaudy red and blue, is one of those extraordinary rostrums found in every town in Haiti, large or small, whether dating or not from the time of the French colonization I do not know. From these open-air pulpits addresses are made to the populace, and laws are proclaimed. The Champ de Mars has, no doubt, been much improved of late, and may even in time be made an open space of agreeable appearance. At present it consists of irregular patches of turf, crossed in many directions by roads authorized and unauthorized, some of which are macadamized.

The houses in the suburbs of Port-au-Prince are for the most part built by Germans, and are really tasteful in their architecture, cool, comfortable, and surrounded by beautiful gardens. The public cemetery, on the other hand, is a staggering mixture of beauty (vegetation and the old tombs), grotesqueness (the modern miniature houses and goblin huts erected to house the deceased), and horrors.

Port-au-Prince possesses market buildings which are worthy of Paris in size and design, but the interior is nauseously filthy, so much so that the mass of the country people prefer to establish themselves in open-air market-places away from the great buildings erected for their use. In these open-air markets there is endless material for the painter or photographer. The sellers are mainly women, who have journeyed into Port-au-Prince from the country, riding sideways on donkeys, horses, or mules, situated, it may be, on the top of enormous panniers of provisions. Nearly every woman wears a large and picturesque straw hat, fastened by a leather band under the chin that ends in little twiddles of leather so absurdly resembling the pointed chin beard of the negro man that the market-women look like men dressed in women's clothes. These clothes are always ample and picturesque, usually blue cotton, or else gay prints with many flounces. Some of the women in the market-place are selling fish which an artist would purchase for their colours alone. They look like the *poissons d'Avril* in Eastertide shop-windows—such combinations of blue and orange, scarlet and mauve, yellow and black, pink and green. Other vendors are surrounded by a troop of tethered turkeys, fine, plump fowls, or Muscovy ducks. Goats, sheep,

cattle, and pigs wander where they please. Pigeons and an occasional green parrot lend variety to the immense crowd of humans, beasts, and birds.

One curious point about Port-au-Prince and the whole of Haiti and Santo Domingo is that the turkey buzzard (*Cathartes*) is entirely absent, a strange contrast to all the other West India islands and the Southern United States. Haiti has no other scavengers but pigs and dogs.

The water-supply of Port-au-Prince is grumbled at by the residents, but though it may not be as perfect as tradition relates it was under the French Government, it seemed to me to be very much better than in many other West Indian towns I have visited. Some of the fountains are very picturesque, and obviously date from the French period of over a hundred years ago. All over this large town there was an abundant supply of good, fresh water for the poor as well as the rich, and the drinking-water usually served one in hotels and private houses seemed to me pure and good.

Port-au-Prince is always hot, often dusty, and a good deal afflicted by mosquitoes; it has many other faults, no doubt, and yet it is not half a bad place. Ice is abundant and cheap. There are at least two good newspapers, one of which gives a very ample supply of European cablegrams. It is a noisy place; the dogs are perfectly sickening in their midnight howlings, alarums, and excursions; there is too much military music, and on festivals people let off guns and fire crackers. And yet it is one of those places that by a strange inconsistency one is sorry to leave and glad to return to. The educated Haitians, however they may mismanage their public affairs, are most agreeable people to meet in society—witty, amusing, well-read, except in the natural history and botany of their own country. There is a very pleasant club where the European and American residents meet the natives of Port-au-Prince, and a delightful friendship seems to exist amongst all the foreign residents.

I have referred to the German suburban residences of Port-au-Prince, especially those which lie on the south-east of the main town. But perhaps the most beautiful district within easy reach of the capital is round about Diquiny and Bizoton. The railway runs along the shore road from Port-au-Prince to the vicinity of these outlying bourgs, and there is as well a fairly good carriage-road, with picturesque old bridges over the innumerable streamlets that come tearing down from the mountains. Here, between Port-au-Prince and Léogane, many of the beautiful country seats are little more than modernized reconstructions of the estates of the French planters. The district is musical with a never-absent ripple of falling water, and the extravagant tropical vegetation is reduced to orderly pictures by masonry runnels and conduits of the old French irrigation systems. Probably nowhere else can one see such a complete riot of brilliant colour. The clouds, attracted by the high

mountains, are always a feature in the landscape—dazzling white cumulus at noonday, becoming flamingo-red in reflection of the sunset. The high mountains are purple-grey. The sea of the Gulf of Haiti is the most brilliant blue-green. The distant town of Port-au-Prince is pink and white and grey. Around the many-coloured houses are groves of crimson-scarlet *Poinsettia* or smalt-blue *Petræa*, together with roses, oleanders, allamandas, hibiscus, and a hundred and one flowering shrubs and creepers of the tropics. As to the foliage trees, there are royal palms and fan palms, trees unknown to me with huge glossy leaves like magnolias, the primly perfect mahogany trees, the Haitian oak, mimosas, flamboyants. In this region is indeed an earthly paradise, with the delectable mountains behind, up which, if you choose, every morning you may ride to the pine-ridges and the air of Europe.

Every square mile of Haiti (I should think) is beautiful, or at least is interesting. The greater part consists of masses of incredibly tortured mountains. No doubt in the far distant past it has been the scene of volcanic energy. Yet there is not much actual area covered with lava or igneous rock. For the most part the formations seem to be of limestone, a limestone which in places is such a pure cold white as to look like snow. In the very high mountains—nearly 9000 feet—the hasty observer might well be excused for believing that he saw vestiges of snow in the crevices or deep clefts of stream valleys. In reality it is due to the rush of water from the summits, which tears away the surface soil and reveals the limestone. In the dry season many a river valley is blazing white with its tumbled masses of chalky stones and pebbles.

The plains of Haiti occupy but a small portion of its area, and they are usually fertile, or could be rendered so by irrigation. Where they are uncultivated they are overgrown with a low scrub of very thorny mimosa and logwood, but even this is rendered tolerable by the highly scented yellow blossoms and by the clumps of weird-looking cacti. Here, in this low-lying country, are specimens of arboreal cactus worthy of Mexico. A form of prickly pear (*Opuntia*) grows to a height of about 30 feet in a solid stem, and pushes out in all directions great pudgy hands of flattened leaf-stalk, studded (as though with giant rubies) by red flower-buds or blossoms, and having a strange resemble to some Hindu god or goddess with innumerable hands. A species of *Cereus* (bristling with white thorns) grows in erect columns. Another and thornless *Cereus* is so grotesque in the pointing of its fat gouty fingers that it, together with another writhing, snake-like arboreal cactus, might be the fit surroundings of an enchanter's cave in a pantomime. Perhaps, however, the most beautiful item in the vegetation of the plains and mountains of Haiti (ranging from sea-level to 7000 feet) is the agave with its basal cluster of immense, bright green lily leaves and its flower stalk 20 to 30 feet in height tufted with clusters of golden-yellow blossoms. In and out of the corollas of these golden flowers dart woodpeckers of crimson, black,

EPIPHYTES AND AEROPHYTES GROWING ON A JAMAICA TREE.

THE VALLEY OF A HAITIAN RIVER, SHOWING THE WHITE LIMESTONE FORMATION IN THE RIVER-BED.

and gold, starlings of black and silvery yellow, metallic humming-birds, innumerable small quits of variegated tints. Hovering over these and occasionally making a successful dart are small kestrels of bright chestnut-orange and dove-grey, with bars and splotches of deep black. Haiti, in fact, is full of interesting bird-life, and should be a great field for the ornithologist, as its ornithology is only partially known and studied. Columbus noted the abundance of bird-life when he discovered this great island, and referred especially to the songs of the nightingales. These are really mocking birds, apparently the same as the American species.

The scenery of Lake Azuey is perfectly beautiful. Its salt waters are of an intense blue-green, and the surrounding mountains, clothed with forests of *lignum vitæ*, of glaucous green fan-palms, and on the extreme heights of Georgian pines, rise to altitudes of 6000 to nearly 9000 feet. At its eastern, Dominican end is a colony of the scarlet American flamingo.

And what may not be said in detail about the Haitian mountains? The highest (Mont de la Selle) is a few feet under 9000, but the ridges rise so abruptly from sea-level or from the tremendous gorges which separate one massif from another that you get the full value of their height. They have been carved by water, sun, and wind into the most exaggerated relief, and many of their crevices are illuminated by the fissures of limestone. Here and there is a curious intrusive hummock of bright red clay, only partially revealed because of the exuberant vegetation. This again assumes so many tints owing to the season or the sunlight that the Haitian hillsides frequently resemble a turkey carpet with their scrub of scarlet fuchsia, rose-pink honeysuckle, intensely green bracken and maidenhair ferns, and the mauve-and-white of certain *Compositæ*, the purple of many labiates, the yellow-and silver of everlasting flowers. The large white blossoms of the local blackberry (which has a most delicious fruit the size of a mulberry) should not be omitted in describing this beautiful mountain scenery.

In the dells of the mountains, about 4000 feet, are handsome jungles of tree ferns. Everywhere grows the glossy green agave, with its lofty column of gold flower-clusters. The aromatic scent of the pine woods is indescribably good to the jaded European exhausted with the tropics.

And nearly everywhere, except on the highest peaks and ridges, may be seen the picturesque and happy peasantry—happy if dwelling far enough away from the oppression of the town governments. Wherever there is a fairly level patch or plateau there is a collection of thatched huts surrounded by an emerald grove of bananas, and by fields of maize, sorghum, cabbages, and sugar-cane. The country swarms with domestic birds and beasts—horses, donkeys, pigs, dogs, cattle, goats and sheep, turkeys, fowls, and guinea-fowls. The peasants usually wear clothes of blue-dyed cotton and huge straw hats. The dress of the men is a blue

gaberdine and trousers; that of the women is a loose robe not unlike the Egyptian costume.

Altogether the country of Haiti is beautiful to look at, and might, with a better government, be made an earthly paradise to live in, not merely for the sake of the foreigner or the tourist, but for the 2,700,000 negroes and negroids who first conquered and then purchased it from the power of France.

The scenery of such parts of the Republic of Santo Domingo (Republica Dominicana) as I was enabled to have a glimpse of, naturally resembled that of Haiti. I am informed by Americans that the landscapes of the auriferous Cibao range of mountains (highest peaks averaging 10,000 feet) were surpassingly grand, and the pine forests more abundant than in Haiti. The highest point in the whole of the Antilles seems to occur in Santo Domingo—the Loma de la Tina. This apparently has never been ascended, and its guessed-at altitude (10,300 feet) has not been as yet confirmed by the American surveys. In the more northern part of the Cibao range is the striking peak of Yaqui, about 9700 feet.

The Spanish civilization of the Dominican republic (which has an area of nearly 18,000 square miles) gives a picturesqueness to town or village life which is quite different to the colonial French or purely Negro aspect of inhabited Haiti. The game-cock is everywhere much in evidence. There are some negroes in Dominica, but the mass of the population is of Spanish or mixed Spanish-Amerindian origin—a handsome, well-set-up, grave, virile-looking people of olive or pale yellow complexion. The Americans, who are giving a general direction and advisory control to Dominican affairs, are effecting wonders of happy and wise development in the exploration, communications, industries, and commerce of Santo Domingo. Their customs officials and surveyors are of the best American pioneer type.

It is really necessary for geographers that we should agree on a joint name for the great island which contains the two radically distinct states of Haiti and Santo Domingo. For this purpose I would propose to revive Columbus's first name of Hispaniola. Santo Domingo was only the name given to a town (the existing capital of the Dominican Republic). It is true that the French of the eighteenth century adopted this (Domingue) for their colony; but after the withdrawal of the French the independent negroes revived the original Amerindian name for the western part of the island—Haiti. The Spanish settlers, however, who did not remain long connected with the Negro government of Haiti, retained, or rather reinforced, the appellation of Domingo (Dominica), which Columbus had originally applied to a landing-place first discovered on a Sunday.

Nearly midway between the south-westernmost extremity of Haiti and Jamaica is the tiny islet of Navassa. This rises precipitously from

the sea to an altitude of about 200 feet. It has one small cove or landing-place to the south. The upper surface is fairly covered with dense tropical forest. Some years ago an American concessionnaire obtained from the Haitian Government a concession for the exploitation of the guano on Navassa. Since then (though the guano seems hardly worth working) the island—say the Haitians—has been practically taken possession of by the United States Government. This is denied at Washington, but on visiting Navassa I found it in the possession of some quiet resolute American men, who were building themselves substantial and agreeable-looking houses on this little islet of forest-covered rock. Navassa might become of some importance after the opening of the Panama canal, as a place of call for United States men-of-war.

Jamaica, as seen from the roadstead of Kingston, offers sumptuous scenery. The spit of Port Royal is a flat tongue of land accentuated at its extremity by tallish buildings—earthquake shattered—and casuarina trees and coco-palms; but it partially encloses like a huge natural breakwater a vast lagoon—one of the best natural harbours in the world. Beyond this and the narrow green plain, hazy with the smoke of Kingston, rise the majestic Blue mountains, tier after tier, till their summits are often lost in the clouds. They are very different to the clear-cut, brightly and diversely coloured mountains of Cuba, or the bare blue ridges carved and scarped by water and crested with scattered pine forest in Haiti. The mountains of Jamaica are so densely clothed with diversified forest that their outlines are softened, while the prevailing tint in a distant view is indigo or purple. Jamaica at first sight looks like an exaggerated edition of Madeira.

Although several brilliant pens have dealt with Jamaica, due justice has never been done to the amazing beauty of this island, as is the case with Cuba and Hispaniola. The fact is that the Greater Antilles take a very high rank in the category of lands remarkable for grandeur or loveliness of scenery. Moreover, each of the three islands of Cuba, Hispaniola, and Jamaica is so individualistic, so unlike the other two in the character and colour of the landscapes, the buildings, and costumes of the people that they are difficult of comparison: the one may be praised without any slur on either of its neighbours.

Indeed, considering the close geographical proximity of Jamaica to Cuba and Haiti, it is singularly unlike either of these two countries. Possibly it bears a greater general resemblance to the opposite mainland of Spanish Honduras. But although its mountains rise in parts to over 7000 feet, it does not possess a single indigenous pine tree; whereas the mountains of Hispaniola and Cuba and the territory of British Honduras are celebrated for their forests of Georgian pine, growing sometimes as low down as 2000 feet only above sea-level. Jamaica is in the same

latitude as southern Haiti, but it is considerably more tropical in its vegetation, perhaps on account of its greater rainfall. The forests, in magnificent lavishness of growth, resemble much more those of equatorial South America.

The island of Jamaica has an area of 4207 square miles (as compared to the 44,000 square miles of Cuba and the 29,820 of Hispaniola). Its total population, however, now stands at nearly 850,000. Of this about 15,000 are white (mainly British); about 1000 are Chinese, 15,000 are East Indians (of the Tamil group, chiefly), some 9000 consist of Cuban and Haitian half-castes, of Syrians and unclassified types—hybrids between Negro, European, and Asiatic; finally, over 800,000 are negroes and negroids (mulattoes and octoroons). The people of pure Negro stock probably number 670,000. With a total negroid population of 800,000 in 1909, Jamaica takes a place of considerable prominence in American politics, aided, of course, in this by its remarkable geographical position—nearest of the Antilles to the Panama canal, and therefore the future pivot of marine transport in that American Mediterranean, the Mexican Caribbean sea.

The importance of Jamaica, however, is only just beginning. Although it is little more than half the size of Wales, it might easily support a population of five millions, and still not be overcrowded. Two-thirds of its surface—excepting the precipitous limestone mountains and a few tracts of marshy land in the south—are suited for cultivation. Although it is likely to be in the future largely a black man's country, because of the preponderance of negroids at the present day, and of their rate of increase, physical vigour, and material prosperity, there is really no climatic reason why Jamaica should not support a population of a hundred thousand whites. A very large proportion of its surface away from the sea-coast is elevated above sea-level from 2000 to 7000 feet, and contains stretches of healthy park-like country where persons of European descent can live in a climate resembling that of an average English June, a climate singularly beneficial to tuberculous complaints.

The north coast of Jamaica bears a resemblance in general outline and scenery to the French and Italian Riviera. Strip this Mediterranean district of its palaces or palatial hotels, take the snow from off its mountain-tops, but endow it with such tropical vegetation as Kingsley revelled in (first by the divination of the story-teller, and latterly with the pen of a geographer), and you have that wonderful "Cornice" drive all along the north coast of Jamaica, from Manchioneal and Port Antonio to Montego bay and Lucea. Here there are about 300 miles of road following closely the sea-coast, with forested, verdure-clad cliffs or mountains (broken occasionally by river-valleys) on one side, and on the other, palm groves and limestone rocks or coral reefs, over which the blue sea breaks in fountains of snowy foam when the

northern breeze blows stiffly. Amid these reefs there are marvellous sea-gardens, wherein from the road parapet immediately above you can descry sponges, anemones, and polyps, sea-lilies, crabs, and parrot-coloured fish, through a film of blue-green water in times of flat calm. It is indeed the New Riviera, and the strongest attraction of Jamaica to every one who has a mind to see and be interested in other things than alternate golf and bridge.

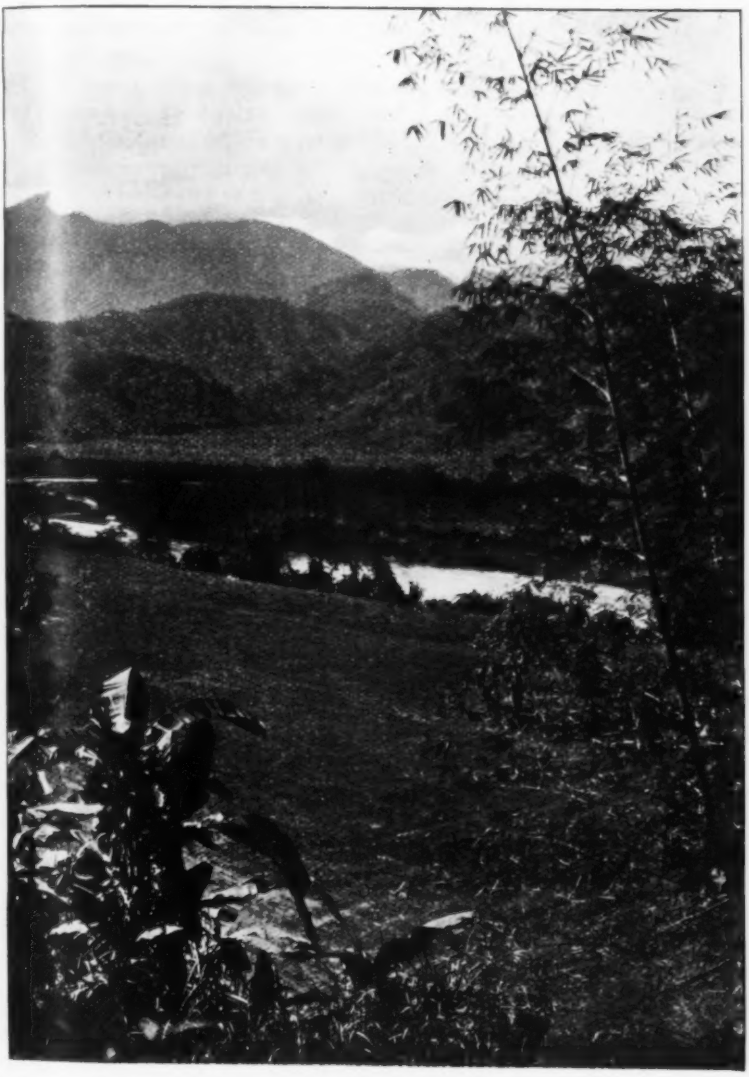
One element of the picturesqueness of Jamaican scenery is the limestone formation which is characteristic of so much of the coast and the lower mountain ranges. Rain-water has carved the limestone into remarkable amphitheatres, known locally as "cockpits" (Kingston harbour is really a submerged cockpit), or has washed out large and small caverns—many a one of which along the north coast must have been seen by Shakespeare with the intuition of genius when he described the island home of Prospero. Or there are natural bridges, strange tunnels through which a stream disappears underground to emerge on the other side of a mountain as a full-blown river. The entrances to these caverns, worthy of Prospero or Merlin, are hung with fantastic curtains of trailing aroids and cacti, draperies of maidenhair ferns, and matted tangles of pink begonias. On the white limestone rocks lizards of blended ultramarine, grass-green, and dull red bask in the sun. Humming-birds with emerald gorgets and long black plumes to their tails flutter in the sunlight round the tubular blossoms—orange, blue, mauve, rose-pink, waxy-white, purple, lavender, and sulphur-yellow—of a hundred different kinds of creepers, lianas, or rock-dwelling plants. Some caverns might be arranged for Sycorax rather than Prospero and Ariel. Their portals are wreathed with snaky cacti or are defended by stiff *Bromeliaceæ*, whose sharp-pointed leaves are armed with the teeth of a saw. The limestone bottoms of the tranquil streams and still pools where the overflowing waters of Jamaica rest after precipitous descents from mountain peak to valley, give a lovely tone of blue-green to the clear water which is a frequent interlude in the landscapes to the limestone crags, cliffs, boulders, and caverns.

The splendidly made, limestone-surfaced, parapeted roads of the Jamaica coast-line lead the delighted traveller past one romantic harbour after another—harbours partly enclosed by fantastic Capri-like islands, where picturesque sailing craft (the hulls often painted bright red) lie in still waters of purple and green, alongside piers of bamboo and palm, at which they unload or receive brightly coloured cargoes of fruit or foreign produce. The harbours mostly bear Spanish names, and are frequently reminders of some episode in the history of Jamaica during the sixteenth, seventeenth, and eighteenth centuries. Here was a pirate stronghold; there was the last stand of the Spaniards. From that ruined fort, half overgrown by palmetto palms, may have been witnessed the decisive defeat of a Spanish or French attack, or the capture of a

contraband slave ship. The ruined dwelling-houses and sugar-mills tell of a less distant past when, under the changing industrial condition of Jamaica—the transition from slavery to eventual free labour and the competition of beet-sugar—many an old free-living family of British Jamaicans came to financial grief. The old home was abandoned, and the sugar plantation gave way in course of time to coffee, oranges, cacao, or bananas. The ruins may not be more than sixty to a hundred years old, but they have sometimes the dignity of a mouldering castle or monastery. The climate of Jamaica has coloured the walls of stone or brick with brilliant lichens and thick green moss-ferns in every cranny and perpendicular fringes of the *Rhipsalis* cactus, like mistletoe in its growth. Lofty trees grow from the desecrated alcoves or the bow-windowed front of a drawing-room. The unheeded leat of water which once played some important part in the industry of the sugar-mill now drips away to form a magnificent pool of water-hyacinths. The crumbling masonry tank that was once a refreshing plunge-bath has become the dry playground of brilliant-coloured lizards.

Yet in close proximity to these ruins are spick-and-span verandahed houses of painted wood, mounted high above the ground on pillars or blocks of concrete, approached by flights of steps and terraces of stone or brick, bright with flowering shrubs or roses. There are ruined churches—why ruined no one can tell me, since they were abandoned long before the recent earthquake—and within sight of them new chapels of wood and corrugated iron. Corrugated iron, indeed, enters somewhat too lavishly into the modern architecture of Jamaica, from the negro cottage to the Government building. A much more picturesque form of roofing is the American shingle of pine wood. The Spanish tile seems to be unused. As a rule, however, the Jamaican towns and villages are pleasing to the eye. There is no uniformity in the style of houses, and they are usually gay with colour or dazzling white with limewash; and, of course, every dwelling is surrounded by magnificent foliage and brilliant flowers—*Hibiscus*, *Thunbergia*, *Bignonia*, *Petræa*, and *Bougainvillea*; by the red, yellow-green, and purple leaves of the crotons; and by orange trees loaded with golden fruit, grape-fruit with their large lemon-yellow globes, the crimson-fruited akees, and the purple-and-green star apples.

January is the opening of spring in Jamaica, and the flower shows of fields and gardens then transcend any reasonable description. Particularly remarkable is the honey-scented, sulphur-yellow blossom of the logwood trees, and an almost Japanese effect is produced along the roadsides and in garden fences by the *Gliricidia* with its sprays of lavender-pink bean-blossoms, laburnum-like in growth. Verandahs and outhouses are covered by the immense white or smalt-blue flowers of the Thunbergias, by the scarlet-orange Bignonia from Brazil, white Jasmines, yellow Allamandas, and the too common magenta Bougainvillea.



A TYPICAL JAMAICA LANDSCAPE.

Away from the handiwork of man, the forested mountains constitute beautiful natural botanical gardens. The copses of tree ferns on the lower and middle slopes of the Blue mountain range are alone worth the twelve days' journey from England. Then there are the handsome upright fronds of the wild bananas (*Heliconia*) with blue-green stems and scarlet and yellow spathes; the foliage of the eight species of palms indigenous to Jamaica; a naturalized myrtle with large creamy-white flowers; the extraordinary cacti, trailing, arborescent, and stumpy; the handsome papyrus-like rush in the coast swamps, and the king of the reeds (*Gynerium*) with an immense plume of fawn-coloured blossom; the lofty bamboos with their yellow-green foliage and bottle-green stems; the banyan fig trees with innumerable depending roots and trunks of immense girth; the silk-cotton trees with their glabrous mauve-white trunks and horizontal branches towering 100 to 200 feet into the air; and several other giants of the forest, which might be nicknamed "poor relations' trees," since their main trunks and huge horizontal branches support an extraordinary family of divers parasitical plants—aroids, bromeliaceæ, cacti, and ferns. A feature of the Jamaica hedgerows at this season (January) which is grateful to the eye of the English or American tourist is the large white wild rose (*Rosa lævigata*), with its centre of golden stamens.

Jamaica was well termed "the land of wood and water," if such was really the meaning of the old Indian name (which was probably pronounced "Shaimaka," and was rendered by the sixteenth-century Spaniards as "Xaymaca"—later "Jamaica"). Curiously enough the same name was applied by the Indians to the eastern extremity of Cuba, also a land of high mountains, rich woods, and numerous streams. This district of Cuba is still known officially as "Jamaica," pronounced in the modern Spanish fashion, and is still peopled by a race mainly Indian in blood. (There is frequently a similarity in sound, and probably in meaning, between the few remaining river and place names of Arawak-Indian origin in Haiti, Cuba, and Jamaica.)

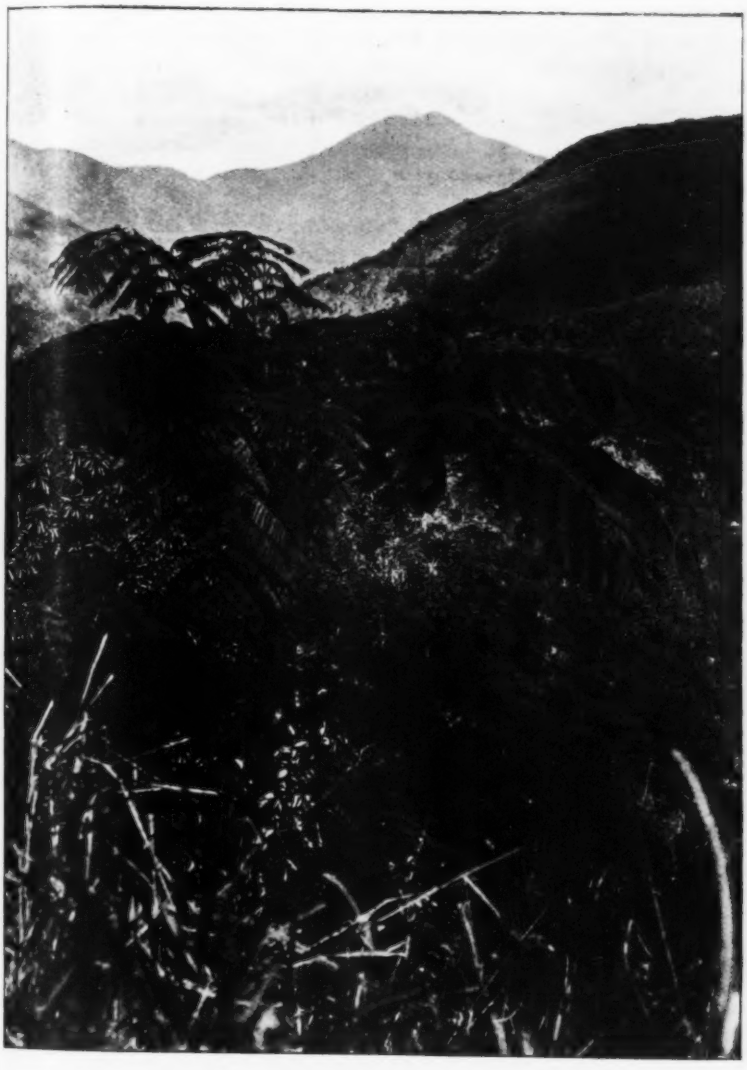
The leading features of the last-named island at the present day, as at the time when the Spaniards first saw it, are dense forests and innumerable streams. The cascades of Jamaica are too numerous to catalogue, and many of them are of quite unique beauty, owing to the limestone rocks and the fantastic vegetation.

The climate of the island is not uniformly moist. The north-east portion has a rainfall of over 100 inches annually; yet within a few hours' journey of this land of dripping forests, where landslides are unfortunately common and sometimes of disastrous occurrence, is the relatively dry district of Kingston where the rainfall seldom exceeds 35 inches in the twelve months. There are several parts of Jamaica which require irrigation to supplement their rain-supply in order to maintain all the year round the cultivation of fruit and crops. Irrigation

canals may therefore be seen here and there along the south coast of Jamaica, and one of these is the resort of tourists in punts, because the makers of this canal have had the good sense to render it remarkably picturesque by the planting or retention of trees on either side. Indeed, this Rio Cobre canal might be a natural river flowing through a dense tropical forest of unusual beauty. Here and there it widens into bays covered with masses of reeds and water-hyacinths.

If, in addition to a care for the forests and the floral beauty of Jamaica, the Colonial Government instituted a strict protection of bird-life over the whole island, this country would have an additional attraction for residents and tourists interested in natural history, so far as they admire birds in a landscape. As it is, though a constant destruction of bird-life is going on at the hands of the European and negro gunners, partly to supply the plumage market, the wild birds are still a feature in Jamaican scenery. I have already alluded to the humming-bird with the long tail-plumes and emerald gorget which is happily so frequent an episode wherever there are flowering shrubs or creepers. Another exquisite form is the green tody, the "robin" of the Jamaica negroes. This is a tiny bird distantly related to the kingfisher group, with long flat yellow beak and a plumage of emerald green, shading here and there into green-blue, and in addition a splendid patch of scarlet feathers on the throat and breast. Then there are the black *Crotophaga*, cuckoos with parrot-like beaks, the tyrant birds with crests of black and lemon-yellow and shouting crics, the copper-coloured, rosy-tinted mountain pigeons, the tiny little ground-doves, the green pink-cheeked parrots, the large buzzards (almost the size of eagles), and, above all, the turkey buzzards (*Cathartes*), whom the Jamaicans call "John Crows."

But whilst Jamaica is, at the present moment, extraordinarily attractive to the hardier type of tourist, to the painter and the naturalist there is just the beginning of a danger that its local inhabitants and its local government do not appreciate the importance of scenery amongst its real assets. There will come soon, it may be, troops of winter visitors, from October to April, or all-the-year-round sojourners, who will not be satisfied with the frolic dances in the hotels at hot and moist Port Antonio, or the golf and polo at Constant Spring. To these people the natural ferneries, the stretches of primeval forest, the unspoiled waterfalls, the cays and marshes off the south coast, with their myriads of fishing birds, will be the main attraction and the cause of retention. The island has been magnificently endowed with a road system, the like of which possibly does not exist anywhere in the new hemisphere; but the people and the Government think too little of the importance of natural beauty, and too much of the immediate gain to be derived from agriculture. It would, of course, be ridiculous to plead that an island, even of exceptional beauty, of 4200 square miles should be given up entirely to scenic display. The chief consideration of the



IN THE BLUE MOUNTAINS OF JAMAICA: A TREE FERN.

Jamaican Government and people must be agriculture and the commerce that springs from it; but while there are perhaps 3000 square miles of the island which may be wholly assigned to the cultivation of bananas, oranges, coffee, cacao, and tea, the grazing of horses and cattle, yet there should be sufficient left over for the maintenance of forest and the preservation of wild scenery, to the delight of the tourist and satisfaction of cultivated minds among the native-born. It is heedlessness more than malice at present which leads to the profitless destruction of beauty spots.

For instance, there is Fern Gully, some 5 miles of hill road on the route from Ocho Rios, on the north coast, to Moneague, one of the interior towns. Fern Gully is a Devonshire lane transported to the tropics and exaggerated five or six times in its fern-producing capacity. It is, or was, a small world-wonder, justly advertised as one of the attractions of Jamaica. Four years ago, judging by photographs, it was perfect and unspoiled. On either side the mountains rise precipitately, and the banks below the edge of the great forests down to the surface of the road were clothed with twenty different species of ferns growing in lace-like flounces of exquisitely varied pattern. Yet, when I drove through Fern Gully the other day I saw this: a band of men and women workers with hoes, not only cleaning the road surface and making it exasperatingly new-looking, but carefully scraping away with their hoes all that part of the fern tapestry which they could reach on either side of the cliff. "What are you doing that for?" I asked. "To make de road clean, sah," was the answer. Then wherever the banks were not too precipitous some barbarian had come and hoed up the fern jungle to replace it by bananas, coconut-palms, and that utterly wearisome product of the Pacific—the breadfruit tree. Not one of these three was indigenous to Jamaica, and their forcible introduction into this 5-mile-long bower of ferns was a needless outrage which at most brought in a few shillings return to the perpetrators. There is still time to save Fern Gully and to make it as beautiful as it has ever been. To do this the Government of Jamaica should expropriate the landholders for 200 or 300 yards on either side of Fern Gully (the land is mostly virgin forest), and henceforth see that the fern growth continues unchecked so long as the road remains passable for vehicles. And this procedure will bring hundreds of pounds annually into this part of Jamaica, in expenditure on hotels and carriages, and on the poor negro folk who supply the hotels and tourists with provisions.

In the same way protection should be extended to all of the more remarkable amongst the waterfalls. Something might also be done in the way of building rest-houses and extending carriage roads in the Blue mountain and other wilder districts of Jamaica, whither the more adventurous tourists resort for the sake of the magnificent scenery. The most stringent laws should be enacted and put in force forbidding,

under any pretext, the killing of birds or of iguana lizards. All this action means no great expenditure of money, and would result in Jamaica really becoming a great winter resort—a typical Riviera, as well as, with its hill stations, a summer residence for the overheated people of Equatorial America.

A mild type of malarial fever is endemic in the low-lying parts of Jamaica, and, so far as science is at present informed, the sole agency of its transmission is an anopheline mosquito. Yellow fever has not visited the island for years, partly owing to the American cleansing of Cuba; but should it again reach Kingston or Port Antonio, there is the *Stegomyia* mosquito abundant in those towns, and ready for the purpose of spreading an epidemic. These facts have now been publicly stated in America by a visiting commission from the Liverpool School of Tropical Medicine. With far less trouble and expense than the Americans took in Cuba or Panama (because Jamaica is only a tenth of the size) the Jamaican authorities, colonial and parochial, might get rid of the dangerous mosquitoes from the vicinity of human settlements, and so relieve their country entirely of the risk of yellow fever, and eradicate the malaria which still makes portions of the coast-lands unhealthy for the native-born and for the passing tourist who departs from the beaten track.

Before the paper, the PRESIDENT: I have often noticed that when a chairman announces that no words of his are necessary in order to introduce a lecturer to his audience, it is generally a preamble to an exceptionally long oration. To-night, however, this is literally true. In the case of Sir Harry Johnston, who has lectured to us so often, I will defy all precedent and simply ask him at once to be kind enough to address you.

After the paper, the American Ambassador, Mr. WHITELAW REID: Certainly anything like a speech was farthest from my thoughts when I accepted your very gracious hospitality. But he would be a churlish listener indeed who did not respond to your invitation by taking the opportunity at least of expressing the gratification I am sure we have all felt at the admirable and charming lecture by Sir Harry Johnston, to which we have just listened, and our sense of gratitude for the privilege. He has made us know much more intimately and accurately than we knew before many of the peculiarities of what is, I think, one of the most important and interesting archipelagoes in the world, if not the most important.

I have also a congratulation to express. I remember being in this hall once before as the guest of the club and of the Society, coming for the purpose of presenting on behalf of the New York Geographical Society a Gold Medal to a great British explorer, who at that time had gone nearer than any of his predecessors to the South Pole. I congratulate you to-night, sir, that the hero of that evening, Captain Scott, has been found to have trained a successor who has bettered his achievements. Some time you may yourself have the pleasure and honour of bestowing another medal here on this successor—the man who has gone nearest the South Pole.

There is only one other thing in my mind, and that is an expression of grateful appreciation to the lecturer this evening for the kind words he has uttered about the action of my country and countrymen in a portion of the Greater Antilles.

I am not sure that we wanted to go to Cuba; we have certainly indicated every desire to get away from it. A great American statesman three-quarters of a century ago said concerning all the West Indies something that is worth remembering now. He said there was in politics, as in nature, a law of gravitation, and that the inevitable destiny of the West Indies was to gravitate to the United States. That was John Quincy Adams, the real author of the Monroe doctrine. But before America went to war about Cuba, we passed a resolution in our Congress protesting that we were actuated by no selfish motives. Perhaps we protested too much! At any rate, we went on to say that when we had succeeded in freeing the island we should get out of it again. I only beg to call your attention to the fact that we kept our word. We set them up in business for themselves, and left them. They did not succeed so well as we had hoped, and we were forced to go back. We took great trouble and no little expense to set them up again, and then we got out again. You have listened to-night to a tribute, which I am sure will be appreciated in America, to the admirable work done by my friend Governor Magoon, and by my countrymen under his direction, in setting Cuba again on its feet. We have started it once more on the path of national independence, with equal rights and opportunities for all; and we have left it with the fervent hope that this time it may make a permanent success, and that we shall never need to go back, save as visitors. I thank the lecturer of the evening very warmly and heartily for the appreciative words he has spoken concerning the work of Governor Magoon and of our other countrymen lately in Cuba, and can only hope that his expectations of the good results to follow it will be found fully warranted.

Sir GEORGE GOLDIE: I have never visited either Cuba or Haiti or Jamaica, and my only excuse for occupying a minute or two of your time is that, on my way back recently from Venezuela, I had the good fortune at Trinidad—a sister island to those which Sir Harry Johnston has described to us to-night—to join the steamer in which he was homeward bound, and during our very pleasant voyage I was able to obtain from him some of his quite fresh impressions of that western hemisphere which he had just visited for the first time. Sir Harry Johnston is known to all the civilized world as the most extensive, and I may add, the most intensive African explorer now alive. For twenty-five years he has been constant to that continent as an explorer, as an administrator, as an author of magnificent works, and as a very frequent and valuable correspondent of newspapers and reviews; so that, on meeting him, almost my first remark was to reproach him for his infidelity to his old love. However, it turned out to be only apparent. Those of you who have read the remarkable series of letters in the *Times* during his recent journeys over the Southern States of America and the West Indies will have gathered that one of his main objects was to study the African races in their western homes. It must be borne in mind, that although one of the West Indian islands, Trinidad, whose new governor, Sir George Le Hunte, is with us to-night, has an East Indian population about equal to its African population, yet taken as a whole the West Indies are, so far as the human race is concerned, merely an annex to the African continent. It would not, indeed, be going too far to say that no one can be considered competent to speak as an authority on the social future of equatorial Africa, who has not, either personally or through books and newspapers, studied the past and present conditions of the black races in the far West. Sir Harry Johnston has not, of course, been examining social questions alone in his recent journey. He has given his usual attention to other sciences allied to geography; and, indeed, if I had to hazard a guess which of these sciences is his favourite subject (a rather difficult selection when dealing with an Admirable Crichton of geography) I would venture to name botany. This impression is confirmed by the magnificent

photographs which he has shown us to-night, and which I hope he will reproduce in some worthy successor to those great works on Uganda, British Central Africa, and the Congo, which he has given us in the past.

Dr. VAUGHAN CORNISH: I think, we must all have noticed, amongst the many beautiful photographs which Sir Harry Johnston has shown us, that by far the most beautiful were those of Jamaica, and I trust that the admirable lecture he has given us to-night will do something to turn the tide of the tourist to that beautiful island. It is most desirable that we in this country should visit the British West Indies more than we do, not merely for the delights of their wonderful scenery, but also to strengthen the bonds which unite them to the mother country.

Prof. W. M. DAVIS: I should respectfully wish to differ from Sir Harry Johnston with regard to his characterization of his earlier work as the "dry bones" of geography. He referred in this uncomplimentary simile to the extremely important matter of mapping land forms, river courses, coast-lines, and so on. Might we not make another physiological simile, and call these materials the "bone and sinew" of geography? "Dry bones" suggests something unpleasantly derogatory. "Bone and sinew" suggests something fundamentally useful, upon which the graceful forms of flesh and blood, the more lively elements of geography, are properly placed, but without which those graceful forms would have no strength or value. All of Sir Harry's descriptions were geographical, not botanical, in quality, because the plants that he pictured were presented rather as clothing the land-forms upon which they grew, and hence as essential features of the landscape than as botanical specimens. For a fuller geographical treatment, there might be added some explanation of the connection of the land-form with the plant or animal form that occupies it; without this connective tissue the treatment might drift too far towards botany. The beautiful collection of photographs has illustrated the lecture in a most excellent way, and I will, therefore, do no more than express in your name our sincere thanks for the most interesting lecture which we have listened to to-night.

The PRESIDENT: If no one else wishes to make any observations, and as the time is getting on, I think I had better conclude this discussion. We have listened to an account of an extremely picturesque region, and I think that the way in which the photographs have been selected indicates that the lecturer is himself an artist.

PROBLEMS IN EXPLORATION.

II. ORDOS.*

By W. R. CARLES, C.M.G.

IN Colonel Prejvalsky's 'Mongolia' a chapter (vol. 1, chap. 5) is devoted to the subject of the Ordos country, the steppe inclosed within the great bend of the Yellow river and whose boundary to the east and south is defined by the portion of the Great Wall which traverses Shensi and rejoins the Yellow river near Ninghsia in Kansu.

At the time that Prejvalsky wrote (1876), Ordos was regarded as a desolate waste, and classed by him with the "frightful" steppes of

* Map, p. 740.

Alashan. But since that date more has been learnt of the Ordos, and with the advantages of a better acquaintance with it there seems reason now to modify the views entertained thirty years since, and the more readily so as circumstances have altered within that period and have considerably affected the local conditions. The territory granted to the Ordos tribes extended on the north-west to the old bed of the Yellow river (Ulan Khatun), and on the north-east beyond the river for some little distance on the road to Kuei-hua-chêng, but in the latter direction has been reduced by sale or otherwise within recent years. The "tribe" (Mong. *aimak*, Chin. *pu*) is mentioned by Gerbillon and some other writers as consisting of six *koshung*, or banners, but Prejvalsky and Rockhill mention seven by name, and Mayers ('The Chinese Government,' p. 82) gives the same number, adding that certain fragments of the Tumed tribe occupying the region near Kuei-hua-chêng are amalgamated with them, a fact which may perhaps explain the difference in number. Yule is unable to explain how the tribes got their name, Ordos, but mentions that the title was specifically applied to the body of Mongols established in eight white *ordus* or encampments behind the sepulchre of Chinghiz (which he places near the sources of the Tola and Kerulen), "and a migration of their descendants is supposed by Ritter to have caused the transfer of the name to the territory" (Prj., 'Mongolia,' 1, 181). The banners are dispersed as follows: On the north-east, Talde (Rockhill, Talat); north-west, Hangin, or Khangin; west, Otok and Jassak; south, Ushin; east, Jungar, at present the head of the tribe; and in the centre, Van or Wang.

No better text-book can be taken than the work of the great traveller, whose explorations did so much to disclose to Europe large portions of Mongolia and Tibet, of which, since Marco Polo's day, knowledge had mainly been gathered either from Chinese sources or from the writings of the Jesuit fathers at Peking, and the tale, at the time regarded with suspicion, of PP. Huc and Gabet. It is proposed, therefore, in the present paper to use Colonel Prejvalsky's book as a basis to which may be added such notes as may be suggested by more recent travels and discoveries. And it seems necessary to premise that the interior of Ordos does not seem to have been visited by Europeans until within recent years.

It is true that in 1697 Père Gerbillon, in the suite of the Emperor Kanghsi, visited that country, but the route taken only afforded him an opportunity of seeing the south-east corner and the northern frontier, for the great Emperor Kanghsi, after sending on the greater part of his company by a northern route to meet him at Ninghsia, struck across Shansi *viâ* Tatung Fu to Paotê, where some boats had been prepared for his passage across the Yellow river. The difficulties of the crossing detained the whole party there for some days, during which the Emperor not only supervised the passage, but also occasionally himself took an oar to help the crew. From Paotê the Emperor travelled south-west to

Shen-mu, where the Great Wall was reached. This was followed southwards to Yü-lin Fu, where Ordos was entered, and a south-south-west line was taken, which brought the travellers *viâ* Lake Tonghalan-nor to Anpien, near the Great Wall. Continuing to follow the Great Wall, and keeping generally to the south of it, the party reached the Yellow river at Hêng-chêng, where they crossed over to Ninghsia. It was thus but a small portion of Ordos which was traversed, and Père Gerbillon's notes on the route between Shên-mu and Yü-lin refer almost entirely to what was seen on the eastern side of the Wall. The impression which he gathered from the sandhills driven against it by the winds was confirmed by the condition of Yü-lin, for the walls and gates of the town were in places overtopped by the masses of sand. But after entering Ordos, the story which he gives by no means conveys a corresponding picture of desolation, for he tells of strips of cultivation by river-sides, of numerous streams which had to be crossed, of pheasants, and even of an extensive wood, and though reference is constantly made to sand-drifts, quicksands in the streams, juniper bushes and suchlike hardy growth, yet there is no tale of suffering from want of water or sand-storms or similar troubles of a desert.

On the return journey from Alashan, Gerbillon, after following the left bank of the Yellow river for some days towards the north, crossed it in lat. 40° 22′, and took a line thence to Toto (Tokto), which in the main corresponded with that followed by Prejvalsky in 1875 in the opposite direction. But it would seem that the river at the earlier date had its bed much further north, for Gerbillon's route took him as far north as lat. 41° without encountering the river, whose course is shown in Prejvalsky's map as just south of that parallel.

In 1845 Huc and Gabet entering the Ordos country from Kuei-hua-chêng, apparently near Tokto, continued their journey almost directly west to Shih-tsui-tzu, where they recrossed the Yellow river and entered the Ala-shan country. As the travellers passed Dabasun Nor their route seems to have lain somewhat to the south of Prejvalsky's, and their sufferings from the sands were consequently greater, though he too complains of the intense heat of the sand in summer, and of how cruelly it affected the feet of his camels.

Neither Prejvalsky nor Gerbillon on this northern route passed out of the Yellow river valley on to the Ordos steppe to the south. The valley is spoken of by Prejvalsky as from 20 to 40 miles broad, and of an alluvial clayey soil; *i.e.* between Bautu and the meridian of the west end of the Munni ula mountains (circa long. 108° 30′). Farther west it widens out very considerably, and contains two old channels of the river, of which the northern one, called Ulan Khatun by the Mongols, is well preserved. Prejvalsky judged that the river when he saw it was flowing in the southernmost course. About long. 108° several channels, 170 to 200 feet wide, separate on either bank from the river, soon uniting

again with the parent stream; only one, the Baga-Khatun, continues to flow in an independent stream for some distance to the east.

West of this meridian Prejvalsky came into contact with the Kuzupchi sands, which skirt the northern base of the Ordos plateau and extend westwards to Alashan. They seem to have given him the impression on which he based his judgment of the Ordos country. "A succession of hillocks, 40, 50, rarely 100 feet high, lying side by side, and composed of yellow sand. . . . The effect of these bare yellow hillocks is most dreary and depressing . . .; not a plant, not an animal is visible, with the single exception of the yellowish-grey lizards which trail their bodies over the loose soil and mark it with the patterns of their tracks. A dull heaviness oppresses the senses in this inanimate sea of sand. No sounds are heard, not even the chirping of the grasshopper; the silence of the tomb surrounds you. No wonder that the local Mongols relate some marvellous stories about these frightful deserts" ('Mongolia,' vol. 1, pp. 193 *et seq.*). However, the sands of Kuzupchi, which the Mongols say are from 14 to 50 miles wide, are not in all parts the land of death and desolation. Nearer the extreme edge, small oases may be seen covered with a variety of plants (*ib.*, p. 195). Gerbillon also tells the same story, finding occasional morasses, patches of grass or reeds, which broke the monotony of the journey. And neither he nor Prejvalsky experienced the same difficulty in finding their way through the sands as was met by Mr. Rockhill, who, crossing the river in long. 109° 30′, followed its northern bank westwards to Ninghsia ('Journey through Mongolia and Tibet'). His difficulties were increased by the numerous pits dug by liquorice-root hunters, and also by great irrigation canals, which necessitated wide *détours*.

The irrigation works on the north-west side of Ordos were mentioned by Gerbillon, and have attracted the attention of all European travellers who have followed the course of the Yellow river in that region of late years. Rockhill ('The Land of the Lamas,' p. 42) speaks of hillsides west of Lanchou as irrigated by water raised by immense wheels 50 to 60 feet in diameter, and the price being calculated by the length of a joss stick burnt during the time that the water passed over the wheel. But lower down the river, where there is not the same occasion to raise water to high levels, similar engineering skill has been displayed in the construction of canals running parallel with the river. Rockhill writes of country between Shih-tsui-tzu and Ping-lo Hsien, "For miles we followed a huge irrigation canal, from which ran innumerable ditches, leading the water all over the broad valley. This stupendous work has converted an alkaline, wind-swept, sandy plain into a fertile district, where rice, wheat, millet, and fruits of various kinds are raised in great abundance" ('Through Mongolia and Tibet,' p. 38). This irrigation seems to be characteristic of the country through which the river flows towards its northernmost point, and has apparently more

recently been extended to the north-east corner of Ordos. Prejvalsky was there only two years after the Dungan rebellion, and he speaks with astonishment of the excellence of the works and the condition in which the canals were kept, though the population had been practically exterminated.

Later travellers have told of a development corresponding with the fertility of the soil. Thus Dr. Tafel writes: "During the W.-E. course of the Yellow river it is no longer inclosed in the narrow rocky cañons above mentioned, and in the north-western corner of the bend sometimes changes its bed, and thereby forms a very fruitful alluvial country, out of which the Chinese in the last few score years have already almost completely expelled the Mongol herdsmen. By constructing new canals the Chinese are rendering colonization possible on an uncommonly large scale. Other schemes on large lines are also connected with this corner. For some time past the project has been nursed of forcing the river by large reservoirs (*Stauanlage*) to deposit the masses of sediment carried down by its waters, and thus to meet the great and ever-present danger of inundations in the plains, a danger which, as above-mentioned, is caused by the constant raising of the river-bed. But if ever Chinese construct strong canal sluices in this country, they will form on the Yellow river a Mesopotamia which will be able to feed many millions of their superfluous population" (*Z. Ges. E. Berlin*, 1908, p. 383).

In an earlier paper he had expressed the same opinion: "It is strange that in Kuei-hua-chêng and Bautu famines are of frequent occurrence, for with irrigation of the fruitful and wide alluvial plains of the Yellow river valley from Chung-wei by Ning-hsia and San-tao-ho to Kuei-hua and Ho-ku there is to be found an inexhaustible field for rice and for wheat and the two millets" (*Z. Ges. E. Berlin*, 1906, p. 356).

He follows up this statement by pointing to the absolute need of irrigation works: "In this part of the river valley it is impossible to depend upon the rain for agriculture. Rain falls too late, and does more harm than good. The people have often to wait until late in June for the first drops of rain, and then extensive cloud-bursts fall suddenly, which do more to destroy than encourage growth. It seems to me that what the people have to fear is not so much a new flooding of ground saturated with salt as the annihilation of their weak works by high swollen waters" (*ib.*, pp. 356, 357).

The fancied terrors of the Ordos steppe for some time deterred most travellers from crossing it. But Baron von Richthofen ('China,' vol. 2, p. 664) mentions that a few years previous to the time of his writing (1882) Herr Verlinden of the Belgian mission at Hei-ying-tzu had made a journey in the country, and that he found the watershed of the river on the frontier side of the Great Wall to be a swelling

steppe, in which the Chinese had advanced with their agriculture just as they had done further east.

M. Obruchev, who visited western and southern Ordos in 1893, found that in its western division "a northern and southern part must be distinguished." In the former "the plateau was covered with flat hills running in different directions, and rising only some 660 to 1300 feet above the surface. They consist of soft sandstones, mostly horizontal, which are covered, especially in the neighbourhood of the Yellow river, by low hills and *barkhans* of sand. The southern part, down to the southern frontier of the Ordos, consists chiefly of *barkhans* with more or less wide, flat depressions between them, which the Mongols name *chaidams*. These are often bottoms of dried-up salt or fresh-water lakes. Similar sands cover the low left bank of the Yellow river as far north as the Khana-naryn-ula range.

"In the south of the sandy regions of southern Ordos the country rises higher, and there begins the loess plateau of eastern Kansu and northern Shensi. On looking upon it from the plains of the Ordos, it has the aspect of a flat swelling, 1000 to 1300 feet of relative height, divided by ravines into separate parts, named 'mountains' by the natives. On our maps, a range, Lu-guan-lin or Bo-yui-shan, is marked, but in reality it* does not exist. While crossing this region from east to west, and again from north to south, M. Obruchev saw no range, and only found a loess plateau, divided by a labyrinth of ravines into a number of table-topped hills, all of nearly equal height. The slopes of the ravines show loess, which covers the same soft sandstones as in the Ordos. This ravined plateau has a width of about 130 miles from the Ordos plains to the neighbourhood of Tsin-[K'ing]yang-fu. Its northern part is very difficult to travel upon, on account of the ravines which one has continually to cross. In its middle, from Tsin-[King]yang to about Lin-tai, the plateau is less ravined, and is divided into table-like masses 7 to 27 miles wide. The road crosses for hours a plain covered with cornfields and villages, and then, all on a sudden, one sees a wide river-valley, cut in 1000 to 1300 feet deep into the plateau. The immense amphitheatres thus formed have their slopes in numerous small loess terraces, each of which is about 15 to 20 feet wide.

"The passage from the northern to the middle part of this plateau is gradual, but not so from the middle to the southern part, which may have a width of about 50 miles. Again one meets here the same countless ravines, but some order is seen in their orientation from north-west

* Dr. Tafel says that he was unable to discover a range under the name Lu-kuan-ling, but that there is, where Dr. Bretschneider's map shows it, a long though not very high line of mountains which extends from Ching-pien along the Wall to the West (*Z. Ges. E. Berlin*, 1906). It may here be remarked that Rockhill and Tafel found similarly that the range of mountains stretching north of Kuei-hua-chêng and Bautu, which is marked Yin-shan in the maps, was not known by that name, and was generally called Ta-ching- or Ching-shan.

to south-east. Two ranges, separated by the valley of the Tsin-yai[King-yang?] river, may be distinguished, and from beneath the loess one sees the rocks *in situ*, which rise to the height of the plateau, and are covered on their tops with but a thin sheet of loess" (*Geogr. Journ.*, 1895, vol. 5, pp. 263–264).

With reference to this region and the range shown in the maps as the Lu-kuan-ling, Dr. Tafel remarks, "If one examines this natural boundary wall, one finds nearly on the level of An-pien Hsien, to the north and south of the mountain range, some horizontal Upper Carboniferous strata of uniform height, while the range proper is covered by a gigantic loess wall of over 500 metres in thickness. Corresponding with this huge pile of loess, the mightiest which I have ever met, the country is extremely difficult to traverse. From the north one has soon reached the ridge, but on the south narrow loess ravines with vertical walls are cut in deep and wide. Most of the ravines belong to the valley system leading towards King-yang. . . . Some roads from north to south pass over this range; one of the most important was travelled by Obruchev. My attempt to travel in the mountains following their strike failed. They are absolutely without any track for beasts of burden and, without a clever guide, one may seek a long time for water.

"From An-pien Hsien to Ning-hsia-Fu I did not follow the high-road, for this route had been taken by several travellers, but I sought by several circuits for the northernmost traces of the Liu-pan-shan, which one has to cross on the old commercial road from Lan-chou to Hsi-an Fu. I soon struck on the Lo-shan, a range running nearly south, which rises some 800 metres above its surroundings. It was followed by similar formations, *e.g.* Hsi-ku-shan and Niu-tou-shan, which exhibited very complicated and perplexing circumstances in their configuration (*gequälte Lagerungsverhältnisse*). Later on I crossed the Alashan at two different places. The traces of pressure on this wall of the Ordos are much more marked than elsewhere. Some transpositions and flexures south of Ning-hsia seem to point north 10° east. The general character of the formation of the mountain was very difficult to ascertain. Metamorphosis of the strata occurs frequently. Owing to this I found fossils only in a few places, and then in a bad condition. It is due to this cause that wide steppe-valleys extend between solitary rocky mountains of 800 to 1200 metres high and conceal the connection. I formed the impression that east of a line running from Ku-yuan to Ping-liang Fu the whole country is sunken towards the west, and that a similar depression has been formed near Chung-wei on the line of the east-to-west course of the Yellow river. . . . Both above and below Chung-wei the river has to break through the eastern outlines of the Nan-shan, which have a strike of about north 50° to 65° west. It is the wildest part of the navigable portion of the Yellow river; on account of the narrow bends and hidden rocks, boats cannot be used, but only rafts,

and by preference rafts of yak- or deer-skins. This country is also covered by mighty masses of loess, under which there are generally chains of granite" (*Z. Ges. E. Berlin*, 1906, pp. 363–365). In a letter of recent date, Dr. Tafel speaks of the fault on the west of Ordos as extending from Lo-shan and Niu-tou-shan in Kan-su to Ala-shan and Yin-shan on the north-west of the Yellow river, and constituting the most interesting feature of the country through which he travelled.

The altitudes which Obruchev gives are 3180 feet at San-tao-ho (Rockhill, 3450 feet), from which place the level gradually rises to 4900 to 5000 feet, for the flat heights of northern Ordos, and 4300 to 4600 for southern Ordos (Borobalgasun, 4340 feet); *ib.*, p. 264.

Obruchev's explorations in the south and west were supplemented in 1884–5 by a journey made through the whole length of Ordos on its eastern side by his fellow-countryman Potanin, who mentions "their holiest place is a collection of felt tents called 'Edjen joro,' reported to contain the bones of Chinghiz Khan. These sacred relics are entrusted to the care of a caste of Darhats numbering some fifty families. Every summer, on the twenty-first day of the sixth moon, sacrifices are offered up in his honour, when numbers of people congregate to join in the celebration, such gatherings being called *tailgan*.

"On the southern borders of Ordos are the ruins of Borobal-gassun, said to date from Chinghiz Khan's time" (*Proc. of R.G.S.*, 1887, ix. 233).

It is to Obruchev and Potanin that we are indebted for the maps of all that portion of Ordos which lies to the south of the Yellow river valley. Unfortunately, their works have not been translated from the Russian. But the loss is in part atoned for by the account of Dr. Tafel's journey through eastern Ordos (*Z. Ges. E. Berlin*, 1906, pp. 360–365). Travelling from north to south, he saw hardly a single yurt, and seldom had need of his Mongol interpreter, for the people were more than half Chinese. The ground was sown by them with millet, vegetables, buckwheat, and many kinds of barley. Wheat could apparently (*angeblich*) not be cultivated on account of the late rainfall. The main danger for agriculture consisted in the north-west storms, frequently prevalent even in May, which carry away the young seedlings. Indeed, agriculture he found in Ordos to be almost entirely dependent on summer thunderstorms in places where irrigation could not be introduced, as in the southern oases, *e.g.* near the sources of the Yü-lin river.

Coming into the plateau from Bautu, he first had to pass the Yellow river plain, some 16 miles wide, which in its southern portion is a barren steppe. Then, in the ascent, he had to cross a fairly broad zone of immense sand-dunes, some in ridges, others in *barkhans*, before reaching a hilly country (*Hügelland*), which had once been a desert. During three days' march he saw no sign of sand, nor of loess until he reached Yü-lin Fu. Herds of thousands of sheep and hundreds of camels were grazing on the slopes and hills which had not been cultivated. South

of the rich pasture land, on which the Prince of Wang has established his residence, he came on fine yellowish red sands, steadily increasing in depth towards the south. These at first were covered by bushes, but near Jassak were piled up in huge *barkhans*. Then came a hilly land with broad flat valleys, some of which were blocked up by sand, and near Bortai temple was a large saltpetre lake, the products of which are carried for sale to Chih-li and Honan. As he approached the Great Wall at Yü-lin, the masses of sand grew bigger and more naked, with only occasional oases, which were utilized to the utmost by Chinese. Yü-lin, a few miles to the south of the Great Wall, was half buried under the sand; the same vast sands extended from Yü-lin to Huai-yuan, and, with some interruptions to Ning-tiao, near which some large Belgian Roman Catholic missionary colonies are established.

Dr. Tafel mentions that it is only on the east of Ordos, in the country of the Jungar, Wang, and Jassak, that there is grassland, connected along a broad front with Chinese agricultural land, a fact which cost the Jungar prince the greater portion of his district. A short time since his lands had extended across the Yellow river eastwards, almost as far as the towns Horinkar and Ching-shui-ho. But, on one ground or another, Chinese are constantly ousting the Mongols from their possessions, if their lands are worth having, and driving them further north, and the respect entertained by the Ordos Mongols for the Chinese is such that they do not venture to protect themselves against the frauds which are practised upon them.

In 1872 Richthofen concluded, from the scanty information which was then in his possession, that the Ordos country has an "elevated southern rim which is approximately indicated by the line of the Great Wall, and divides the headwaters of several affluents of the Yellow river from a plateau without outward drainage covered with pasture. Those rivers which descend towards the south, east, or west have their origin in a great number of deep gullies, cut precipitously into loess. . . . The plateau diminishes in altitude towards the north" ('Letters to Chamber of Commerce at Shanghai,' p. 30).

The altitudes given by Obruchev for west and north-west Ordos seem, however, opposed to this conjecture. But so much remains still to be learnt regarding this country that it is not yet possible to judge how far Richthofen's supposition is justified in other respects.

In a note on the Kuzupchi sands (Prj. 'Mongolia,' 1, 193) the fact that their subsoil is composed of the same hard clay as the valley of the Yellow river is referred to as confirming the hypothesis that Ordos was once the bed of a lake which forced a way for itself to the ocean by the present channel of the Yellow river (Ritter's 'Erdkunde von Asien'). The character of the surface of the plateau, the water-basins still in existence, and the gentle gradient of the country seem also inclined to favour this theory.

The geological features of the country traversed by Obruchev and Tafel are described by those travellers, but hitherto no one has visited the country intervening between their routes. There is, therefore, plenty of ground awaiting explorers who are looking for fresh fields of discovery, for Huc and Gabet's route traversed only the northern side of this field.

If other inducements are necessary in order to attract travellers to this country, surely the solution of the problem of the burial-place of the great Chinghiz Khan and the collection of all the interesting legends associated with his presence in the Ordos country are sufficient. The story of the death of the great conqueror as told in the Mongol annals (Howorth's 'Mongols,' part i. chap. iii.) attains to a height of poetry which is unexpected in such a people. The removal of his body to its resting-place, the destruction of all the folk who were met on the long and toilsome journey, the mystery attaching to the place of burial, and the legend of the coffin of steel suspended in mid-air in a mausoleum of loadstone, have one and all their fascination for the reader. Indeed, it seems extraordinary that no one hitherto has penetrated through the veil which surrounds the place where his body rests. According to tradition, the body was buried near the sources of the Onon, Tola and Kerulen, in the neighbourhood of the present town of Urga.

"But Père David, who travelled in the Ordos country in 1866, tells us that the Mongols there still preserve most carefully the mortal remains of the famous Chinghiz Khan *bogoto*. They are enclosed in a large silver chest, which they do not readily show to strangers." (Chinghiz-Khan, Howorth's 'Indian Antiquary,' 1887, p. 96.) M. Bonin, thirty years later, visited Yeke-Etjen-Koro (*la demeure du grand Seigneur*) in Ordos, and saw the tomb, the silver coffin said to contain the ashes of the great Mongol, and copies of relics, such as his saddle and sword, which are preserved in the camps of different Ordos tribes, but he does not pronounce an opinion on the authenticity of the coffin. But the ceremonies observed at different dates during the year—among them is the burial of a man up to his shoulders in the ground during the three days through which one of the festivals lasts—have a flavour of reality which seems hardly in character with an elaborate attempt to withdraw attention from the real place of burial by a duplication of stage properties. (*Revue de Paris*, February 18, 1898, pp. 831–835.)

The interesting account given by M. Bonin of the Great Khan's tomb attracted Comte de Lesdain to visit the same place when on his way in 1904 to Tibet. He found near Ho-k'u floods on the same scale as had confronted Huc in 1845. Travelling thence through Jungar, he succeeded in discovering the sacred spot, in spite of the reticence of those whom he asked for information, but was unfavourably impressed with the tomb (?) and its surroundings. In his journey westwards to the Yellow river near Ning-hsia, he passed through the territories of the

Princes of Wang, Ushin, and Ottok, and noticed, as other travellers in Ordos have done, the non-existence of the lakes marked in Chinese maps as formerly existing, which now are frequently mere depressions with saline incrustations ('From Pekin to Sikkim, Lesdain').

My object in writing the present paper is more especially to urge the occasion for some systematic series of observations of the rainfall of this region and the study of the engineering works which have already been undertaken in this portion of the valley of the Yellow river, to reclaim waste lands and to act as a check on the inundations which devastate the plains of China. It is a welcome surprise to me to find that some scheme of the latter nature has already been entertained by Chinese who inhabit that region, but of course the matter, if practicable, must necessarily assume such large proportions that it can be properly taken in hand only by the Government. Whatever work is done in this region which facilitates the irrigation of the country, produces such good results that, even on this ground alone, it is worthy of careful consideration.

With every extension of railway towards Shensi from the coast, the development of the trade from the Far West is bound to increase. Even in the present day M. Bonin and other travellers are struck by the importance of the caravans which are met near Kuei-hua-chêng carrying wool, skins, and other products of the West to Tientsin for export. The route *viâ* Kuei-hua to the West is the easiest for carriage by animals, and will be the easiest for the construction of railroads. M. Bonin has established the possibility of steam navigation on the Yellow river between Bau-tu and Ning-hsia, and a certain amount of trade by skin boats, rafts and scows has always been carried on by Chinese from Lan-chou Fu to Ning-hsia, and from Bau-tu to Honan. But no full development of commerce along this route can be obtained so long as the population is liable any year to destruction by famine. When the spring winds blow away the young corn which is coming up through the light loess soil of north Shansi and the Ordos steppe, famine stares the farmers in the face, and the provision of a large granary in irrigated lands in the far-away valley of the Yellow river may save millions of lives.

The changes of course of the Yellow river in that region seem to have furnished a providential means of guarding against inundations in the south. The old northern channel, called Ulan Khatun by the Mongols, is spoken of by Prejvalsky as well preserved, "1190 feet wide and very distinctly discernible, although completely dry and grass-grown. . . . There are two lesser arms between the former and present channels of the Hoang-ho, which dry up during the hot weather, but are full of water at flood-time. Besides the main river and its channels there is no water in the valley, except in wells, which are invariably very deep. The streams which rise in the border range (on the north) disappear immediately in

the soil, not one of them flowing as far as the Hoang-ho" ('Mongolia,' 2, 11–12).

In comparing the Yellow river with the Yangtse, we cannot fail to be struck by the great natural provision against floods which the latter river enjoys in the immense reservoirs of the T'ung-ting and Poyang lakes. Equally strong is the feeling that it is the absence of such provision which makes the Yellow river a curse instead of a blessing to the low lands which it traverses on its way from the mountains to the sea. If this can be furnished by artificial aid supplementing the natural resources which seem to present themselves for utilization in north Ordos, the gain to China must necessarily be immense.

But I write as a layman who has no engineering knowledge and no personal acquaintance with the country under review, and solely in the hope of directing attention to it, if possibly some good may outcome.

SOME CARTOGRAPHICAL DOCUMENTS OF THE AGE OF GREAT DISCOVERIES.

By EDWARD HEAWOOD, M.A.

Such has been the impetus given, within recent years, to the facsimile reproduction of early maps, that the student may hope soon to be in possession of all the most important documents of the kind, brought out, too, in a style very different from that with which an earlier generation had to rest content. Dr. Ravenstein's monograph on 'Martin Behaim and his Globe,' * accompanied by a full-size coloured reproduction of the latter in gores, is a fitting crown to a life of activity in the cause of geography. Many as have been the author's previous contributions in this field, there is none which brings out so forcibly alike his wide range of information and his critical judgment in dealing with his material. It is fitting that these qualifications should have been brought to bear on one of the most interesting cartographical questions of the fifteenth century, and one in regard to which students have hitherto had to depend on but imperfect aids. The globe and its history, as well as that of its author, have now for the first time met with adequate treatment, and such is the thoroughness with which the task has been performed, that Dr. Ravenstein's study, if not the last word on the subject, must always remain the foundation on which all future work must be built.

The reproduction of a globe-map must always present greater obstacles than that of a plane-map, and in the case of Behaim's globe the destructive work of time has added to the difficulty, and is no doubt

* 'Martin Behaim: His Life and his Globe.' By E. G. Ravenstein. With Facsimile, Maps, and Illustrations. London: G. Philip & Son. 1908. Price £3 3s.

a reason why the execution of the task has been so long delayed. An exact photographic reproduction was, of course, out of the question, but though, as Dr. Ravenstein allows, his copy is not a facsimile in the strictest sense of the word, the care bestowed on its preparation has certainly given us the nearest possible approach to a facsimile. Fortunately for the object in view, the replica made at Jomard's suggestion, in 1847, for the National Library at Paris, has proved, on comparison with the original, to be on the whole an exact and trustworthy copy. Tracings and photographs of this have therefore served Mr. Ravenstein as the basis of his own copy. But he has by no means blindly followed his pattern, but by careful collation with the original globe has introduced corrections which bring us far nearer to that original than any version yet supplied. To recover all the features of the globe as at first made is not to be thought of, the misguided efforts of renovators having caused many of the original readings to be hopelessly lost, and evident corruptions, both of sense and orthography, cannot be eliminated. But Dr. Ravenstein has done all that was humanly possible, and we can only admire the skill and perseverance with which the corrupt and voluminous legends have been puzzled out and reproduced in legible form. A word of praise must also be given to Messrs. Philip for their enterprise in deciding to reproduce the full colouring of the original—a matter of great expense, which they can hardly hope to recover; and to Mr. Griggs, whose well-known skill in colour lithography has never before been better exhibited.

But before speaking of the globe itself and its sources as elucidated by the author, something must be said on the section dealing with Behaim's life and achievements. So much ill-judged and even dishonest panegyric has been bestowed in the past on the Nuremberg cartographer, that, in spite of the excellent contribution of so careful a writer as Dr. S. Günther, much research was necessary in order to show the subject of the memoir in his true character. Dr. Ravenstein has spared no pains to arrive at a true verdict by a study of the whole literature bearing on the question, and he renders a valuable service in the impartial way in which he discriminates between the unsupported guesses of previous writers and the facts which rest on a sure basis. We cannot follow him as he traces the fortunes of Behaim, from his early mercantile life at Nuremberg or in Flanders, to his later career at Lisbon and the Azores, but a few special points may be referred to. One of these is the part played by Behaim in the "Junta dos Mathematicos" appointed by King John II. of Portugal in 1484 or 1485. His claims as a practical astronomer are subjected to a rigorous examination, and it is conclusively shown that they rest on an extremely slight foundation. Even if Behaim had in early years been a pupil of the astronomer Regiomontanus, he had profited little by the instruction received, while the claims made on his behalf that he introduced the use of the astrolabe, cross-staff, or

declination tables, into Portugal, are quite untenable. All that can be said is that he may have *imported* nautical instruments into that country, though even this is a mere guess. Still more important is the question of Behaim's claim to have accompanied Cão on one of his voyages to the Congo, in connection with which Dr. Ravenstein deals fully with the history of contemporary voyages on the west coast of Africa. The evidence against the claim certainly seems all but conclusive, at least if the dates given by Behaim are correct. On the other hand, it is not denied that some traces of a knowledge of West Africa are to be found in Behaim's accounts, but these are quite compatible with the idea that he took part in a less extended voyage, probably that of João Affonso d'Aveiro to Benin in 1484–85. The knighthood conferred on him by King John in 1485 (according to a memorandum still preserved in the family archives, the accuracy of which Dr. Ravenstein sees no reason to doubt) may have been a reward for the part taken by him in such an expedition, or possibly for services against the Moors, if, indeed, it were not gained merely through personal interest, for he belonged to an old patrician family at Nuremberg. As regards the relations supposed to have existed between Behaim and Columbus or Magellan, it is shown that there is no likelihood that he influenced in any way the cosmographical notions of the former (though both held the same erroneous views as to the narrowness of the oceanic portion of the globe), or that any map of his can have guided Magellan to his strait, seeing that no known maps, constructed before Behaim's death (1507), give a hint at the existence of such a strait. The claims made on his behalf to the discovery of the New World are, of course, without the least foundation.

Turning now to the globe itself, the points of interest are so many that we can refer to the more important only. Dr. Ravenstein has been at immense pains to trace the sources, not merely in a general way, but in minute detail, each separate legend being reproduced and commented on. The whole is treated on an equal plan, just as much care being bestowed on the near as on the remoter regions. As might have been expected from so experienced a cartographer, Dr. Ravenstein helps to an understanding of the globe by an interesting series of sketch-maps, in one of which he shows, in correct outline, the world as known to Christian Europe in 1492, while in another he gives an outline sketch of Behaim's globe, distinguishing (1) those portions due to Ptolemy; (2) those based on Marco Polo; and (3) those derived from all other sources.* It brings out in the clearest way the preponderating influence of the two first, especially for the Mediterranean, North and East Africa, and the whole of Asia, with its islands. A great deal of information,

* In a third, he shows what sort of a picture of Eastern Asia might have been given by an intelligent map-maker of Behaim's time on the basis of Polo's travels. It is a forcible illustration of the slightness of Behaim's claim to be considered such.

from Portuguese sources, which might have been at Behaim's disposal, was not utilized at all. Some other authorities were used, and a comparison with other maps of the period (the Laon globe, the map of Henricus Martellus, and others) shows that as regards the continental outlines, the nomenclature of the coasts and interior of Africa, and some other details, we may trace the influence of a type of map of which the earliest examples are now lost. Dr. Ravenstein's acute deductions respecting such unknown sources are of special interest, and though all his efforts to trace the origin of the features in question have been fruitless, he has done a service by calling attention to the field for research which is open to students in this direction. He points out that if we were in possession of the materials at Behaim's command whilst he was at Nuremberg, we should find a solution for many questions which now puzzle us. There are three sections of special interest in this connection. In the region between the Euphrates and the Ganges Behaim introduces a nomenclature of his own, the origin of which is still an unsolved problem; while in Eastern Asia and Africa, although the main features are to be found in one or two other maps (especially Waldseemüller's of 1507), it is evident that a common though unknown original has been drawn upon in each case. In inner Africa many names now appear for the first time, though some are also to be found in the fictitious narrative of Ritter von Harff, whose travels, as Dr. Ravenstein ironically remarks, must have been made on the unknown map above alluded to. One of the names is the "Sacaff" which in one form or another appears so often in later maps as a designation of one of the Central African lakes. On the globe it now reads Saraff—in fact, Dr. Ravenstein seems disposed to accept this form, though on Waldseemüller's map of 1507 it is certainly Sacaff; and there are other cases of the conversion of an original *c* into *r*, as in *ritade* for *cidade*. He says that the name undoubtedly refers to Lake Tsana in Abyssinia, and this is likely enough, though we are left in the dark as to the origin of the name, which had made a previous appearance in literature as the "Saaph" of Berlinghieri's metrical version of Ptolemy (to which Dr. Ravenstein does not refer). The name seems to be here applied, not to one of the two Ptolemaic lakes, but to a *third* lake-source of the Nile.* Is it just possible that it may represent the plain of Sacala, spoken of later by Paez and Lobo in connection with the source of the Blue Nile?

The grotesque delineation of South-East Asia, common to Behaim and many other maps of the period, is another of the features probably derived from some lost prototype. Dr. Ravenstein refers to the great

* Dr. Ravenstein calls attention to the appearance of a third headstream in the Ulm Ptolemy of 1482, as probably derived from one of the unknown maps, and the reference to *three* lakes by Leonardi da Vinci (cf. January number, p. 79) may be referable to a similar source.

south-east peninsula as a duplication of India, but does not this too much convey the impression that it originated as a positive conception, instead of being (as seems to be the case) a last residuum of Ptolemy's representation of the Indian ocean as a closed basin, the eastward prolongation of Africa being due to a similar cause? The names attached to it, on the other hand, seem merely bestowed in the usual random way. The drawing of the chain of great islands is another common characteristic of the same group of maps, the nomenclature being almost entirely derived from Polo. Dr. Ravenstein has no doubt that Java Maior here refers to Borneo, though Yule (and apparently Cordier) accepts the identification with Java proper. For Necuram, on the other hand, he prefers the orthodox identification with one of the Nicobars to Schlegel's suggestion (cf. *Journal*, vol. 19, p. 754) that it stands for Nakur in Sumatra.

Many other points might be referred to, but limits of space forbid. The general result of the study is to show the maker of the globe in a very different light from that in which he is placed by his panegyrists, and its special value lies in the opportunity it gives for the first time of forming a just appreciation of Behaim's true place as a traveller and cartographer. From the latter point of view, his work was certainly not that of an expert, very little judgment having been shown by him in the selection and use of his material. But he by no means stands alone as an offender in this respect, and if we think of the circumstances of the time, we shall not be disposed to judge him by modern standards. Considering the small amount of discrimination shown by the modern public in the choice of maps, we can hardly wonder if the general public of those days was content with a more or less diagrammatic representation, however much the need of accurate charting was recognized by those concerned with nautical enterprise. From this point of view, one is tempted to ask whether too much weight is not often attached to minor variations in early printed maps, many of which may have been merely the result of chance. If it has been necessary to bring down Behaim from the pedestal on which he has been placed, the blame is to be laid on the misguided efforts of former biographers, for, as Dr. Ravenstein shrewdly remarks, probably no one would have been more surprised than Behaim himself at the posthumous fame which has attached itself to his memory.

Of a totally different type, though only ten years later in date, is the map drawn about 1502 (from Portuguese sources) by Nicolo de Canerio, of Genoa, of which an excellent facsimile has been brought out by Prof. Stevenson of Rutger's College, under the auspices of the American Geographical Society and the Hispanic Society of America.* This map —made known to students by Prof. Gallois in 1890, but now for the

* 'Marine World Chart of Nicolo de Canerio Januensis, 1502 (circa).' A critical study with facsimile by Edward Luther Stevenson, PH.D. New York: 1908. Price $20

first time completely reproduced in full size—is remarkable for the accurate way in which it portrays all the latest results of nautical discovery. Some account of the reproduction was given in the *Journal* for December last (p. 647), but it may here be spoken of somewhat more in detail.

The critical study which accompanies the map, besides giving a general description, discusses its several parts in turn, paying, however, much more attention to the New than to the Old World portion. The latter is, in fact, specially reserved for future discussion. Prof. Stevenson begins with the north-west section, where we find the results of Cortereal's voyage to Newfoundland shown in close proximity to the Greenland of earlier maps. This land seems, from the Portuguese flag at its southern end, to be considered as part of the discoveries of that voyage. In fact, in the closely similar Cantino chart, the statement is definitely made that it had been discovered by order of the King of Portugal; while in some later maps of the same type the name Labrador is assigned to it. It is not quite clear what is to be understood by Prof. Stevenson's remark that "doubtless the Labrador of the early maps was generally Greenland," but the association can hardly mean more than that the chartmakers, having laid down Newfoundland in close proximity to the Greenland of earlier maps, were content to let the latter do service for the Labrador coast. The statement of the Cantino chart, that this land was regarded as the extremity of Asia, leaves it doubtful whether the connection was supposed to be with the north-east or north-west of that continent. The analogy of Ruysch's map of 1508, referred to by the editor,* might suggest the former, but the only connection actually shown is that across the North Atlantic with the extreme north of Europe, this being also regarded as part of Asia.

The next land to the south of Newfoundland offers perhaps the most interesting problem of all, though, as Canerio's delineation is followed in other long-known maps, the question has often been discussed before. While Sir C. Markham, in his volume on Cortereal's voyages issued by the Hakluyt Society, made out a strong case for regarding this coast-line as that traced during Cortereal's second voyage (its proximity to the West Indies being merely due to the erroneous latitude assigned to the latter), Prof. Stevenson sees in it a result of early voyages to the Florida coast, of which the record has been lost. He is even inclined to find in it a confirmation of the general truth of Vespucci's statements regarding his "first" voyage, the fictitious character of which has again been argued with so much force by Sir

* In speaking of a manuscript copy of Ruysch's map, which he hopes to reproduce later, Prof. Stevenson would seem to refer to the copy by Glareanus in the set of maps described in this *Journal* for June, 1905; for it is hardly likely that two manuscript copies should have been brought to light almost simultaneously.

C. Markham in his edition of Vespucci's letters. No definite light is, however, thrown on the nomenclature of the coast, and the designation "Cavo doffim de Abull" for its south-east extremity harmonizes no better with the dates of Vespucci's supposed voyage than of others that are known to us.*

The nomenclature of the West Indies does not suggest any special problems, but it may be worth noting that, as in the Cantino chart, Jamaica is already established as the name of the island so known ever since. On the South American coast the nomenclature is particularly full (there being fifty-eight names as against the thirty-three of Cantino), and here we may accept Prof. Stevenson's conclusion that it is in great part derived from Vespucci's "third" voyage, though we find no indication of the rock-bound coast which that navigator claimed to have reached in about 52° S. A tabulation of the names on the Brazilian coast, evidently derived from saints' days,† with the respective dates of the latter, throws no very clear light on the probable chronology of Vespucci's voyage, for it must be remembered that the names do not appear on the chart in the chronological order followed in the table, while several at least of the names must be attributed to other voyagers. As Prof. Stevenson points out, at least eight well-authenticated visits to the Brazilian coast were made between 1498 and 1502. The most southerly name, Rio de Cananor, placed in about the highest latitude claimed by Vespucci to have been reached on this coast, is explained as derived from the feast of La Cananea.

The European section of the chart is passed over as not having been open to new discoveries in Canerio's day. This is hardly true of the northern parts, though the conventional nature of the representation of this part of the world (common to so many maps from early in the fourteenth century onwards) may justify the omission to consider it in detail. More attention is given to the coasts of Africa, but as the contemporary mapping of these coasts has been so carefully dealt with by Dr. Ravenstein in his 'Vasco da Gama' (to which suitable reference is made) and elsewhere, we may pass over this section very briefly. There is a sketch of the voyages which supplied the material for the map, as well as a useful comparative table of names as given by Pilestrina,

* Although the presumption might seem to be that this cape was reached by some navigator at the end of April, it is conceivable that the name is merely an allusion to spring-like weather experienced in its neighbourhood, the end of April being regarded as a turning-point of the year. Thus in the poem supposed to have been written in connection with the tragic death of Mary of Burgundy (the young wife of the Archduke Maximilian) in 1482, the author, La Marche, states that he had completed it—

"Sur la fin davril
que lyver est en son exil
et que leste fait ses explois."

† It is not quite clear why the *spelling*, as well as the location, of Sam Ioam should suggest "that by ioam Jorge may be meant."

Canerio, Cantino, and Waldseemüller (1516).* For the whole region east of Cape Guardafui the editor is content, for the present, to give a list of Canerio's legends. The absence of a commentary on this section, which offers points of interest hardly inferior to the American, is perhaps less to be regretted for the full attention given to it (in special relation to the Arabian sources drawn upon) by the late Prof. Tomaschek in his introduction to the 'Mohit' (*Journal*, vol. 11, p. 76), as well as in the recent work by Dr. Denucé spoken of below.

In a final chapter on the sources and influence of Canerio's map, Prof. Stevenson points out the main points of similarity or difference which it exhibits when compared with contemporary maps, and draws the conclusion that many now unknown charts, drawn by the actual participators in geographical discovery, were in existence in Canerio's day, and formed the basis of the compiled maps, which alone have come down to us. The reproduction of so important a document is a boon to students of early cartography, though it may be feared that the high price charged may put it beyond the reach of many.

In a work of more modest form,† though of considerable interest, Dr. J. Denucé carries the story of Portuguese cartography a step further—into the second decade of the sixteenth century. His special theme is the work of the Reinels (father and son), in regard to which the late Dr. Hamy's study, excellent as it was, left some room for further investigation. The map and atlas preserved in the National Library at Paris (which, though unsigned, may be safely attributed to them) have now for the first time been fully dealt with, and the result is to bring into clearer relief than previously the important services rendered by the Reinels to early sixteenth-century map-making. In an introductory section, Dr. Denucé traces the beginnings of Portuguese cartography in general, and in this the Canerio and Cantino charts naturally meet with full consideration, though attention is also given to the earlier sources (Italian, Catalan, etc.) at the disposal of Portuguese cosmographers of the period. Dr. Denucé may be thought to use the term "Portuguese cartography" in an unduly wide sense, for he deals with many maps that are not actually Portuguese. It seems hardly permissible to place in one main category of *Portuguese* maps the theoretic productions with which, in fact, Portuguese cartographers had less to do than most of their contemporaries. Behaim's globe, again, is hardly to be regarded as the direct fountain-head of subsequent productions of the theoretic type, as Dr. Denucé appears to consider it. He shows once or twice a leaning towards more or less heterodox views, such as those of Vignaud in regard to the relations of Toscanelli and Columbus; and he is surely

* In a similar comparative table for America, Waldseemüller's map of 1507 is included in place of Pilestrina's.

† 'Les origines de la Cartographie portugaise et les cartes des Reinel.' Ghent: E. van Goethem. 1908. Price 10 *fr.*

not justified in saying that while Cantino's chart retains the "Sinus Magnus," in Canerio's this has given place to the ocean. But while exception may be taken to matters of detail, the author shows, on the whole, both judgment and knowledge in his handling of the subject.

In the second section, Dr. Denucé traces the life-history of the Reinels (so far as it can be made out), and the influence they exercised on the cartography of nations other than their own. In the third, the maps above alluded to are described and analyzed. They consist of a loose Portolano sheet, nearly 4 feet in length, and an atlas of four smaller sheets, the whole supplying a representation of all the then known world except Africa, which would seem, however, to have originally been included. They seem to have been drawn, about 1516, for the use of some member of the Portuguese Royal Family. All the sheets but one have designs on both sides of the parchment, the large sheet showing the Atlantic ocean on the recto and the Mediterranean on the verso. The former chart was discussed by Harrisse in his 'Terre Neuve,' but Dr. Denucé calls attention to some points overlooked by that writer. Of the four sheets of the atlas, two depict Europe and Brazil respectively (with the Azores on the verso of the first), while the others present a series of maps which, when put together, form a complete chart of the Indian ocean and surrounding lands, showing the Reinels' conception of the route to the Moluccas—in those days, no doubt, the chief matter of interest. It presents a remarkable combination of accurate nautical knowledge with theoretic geography; for though the Malay peninsula and islands are fairly well shown (for the time), the "Sinus Magnus" still figures in the Ptolemaic form, with its eastern coast-line stretching down to the southern border of the map.

Dr. Denucé gives photographic reproductions of the maps of the Atlantic and Brazil, and an outline sketch of the maps of the Indian ocean suitably pieced together, together with sketches of the Reinels' signed map of the same ocean (of 1517) and of the anonymous Munich map of 1520, which he does not consider as actually their handiwork. The character of the maps is, he thinks, to be explained by reference to the person of mark for whom the atlas seems to have been intended. The charts would, in fact, have been of little practical use to sailors, although based in the main on nautical data.

That the edition of the 'Islario' of Alonso de Santa Cruz,* brought out in connection with the Sixteenth Congress of Americanists, has been reserved for notice at the end of this article, does not imply any inferiority of interest, but that the later date of the original work places it in a somewhat different category from the publications already referred to. The document, now first printed in full, is, in fact, of the

* 'Die Karten von Amerika in dem Islario General des Alonso de Santa Cruz. Mit dem Spanischen Originaltexte und einer kritischen Einleitung herausgegeben von Franz R. von Wieser.' Innsbruck: Wagner. 1908.

highest importance for the history of American discovery and cartography. In a brief introduction, Prof. von Wieser points out the prominent place occupied by Santa Cruz among his contemporaries for the extent and many-sided character of his work. Of his contributions to geography, his map of 1542 has been available to students for some time, but the 'Islario'—a still more important work—has been dealt with only in fragments. It exists in three different manuscripts, two at Vienna, one at Besançon,* but none includes more than parts 3 and 4 of the work as originally planned, and it is probable that the design was never carried out as regards the first two.

It is the fourth part only that is now reprinted, with facsimiles of the original maps; but it is this part which has by far the most value by reason of its author's official position as cosmographer to the Spanish crown, and his personal share in American exploration. As regards the date, given by Navarrete as 1560, Prof. von Wieser shows good reason for placing it as early as 1541, a fact which adds considerably to the interest of the work. Although called an 'Islario,' the work (like others similarly named) does not confine itself to islands, but portrays almost the whole coast of America except the Gulf of Mexico. There is a plan of the city of Mexico, which bears a general likeness to the separate plan known from the same hand, but differs from those given by other authors. The fact that Santa Cruz took part in the Cabot expedition of 1526 to the La Plata gives a special interest to his delineation of this region, which we accordingly find shown with more accuracy and in greater detail than in other maps of the period. The names Rio de la Plata and Buenos Aires now make their appearance for the first time. A point to which the editor calls special attention is the marking, in the northern interior of South America, of the "Governacion de Los Belzares," no other map giving, it seems, any reference to the famous house of the Welsers. Some new details also appear in the region of the strait of Magellan.

Prof. von Wieser points out that this collection of maps is entitled to rank as the first special American atlas—a distinction which has previously been claimed (as by Prof. Grande, cf. *Journal*, vol. 29, p. 670) for Gastaldi's maps in the Ptolemy of 1548. A comparison of the two sets of maps, and, in general, of the 'Islario' with other contemporary documents, would have been interesting. But the editor, no doubt wisely, avoids a detailed examination of the subject-matter, which his publication will permit future students to make for themselves.

* The statement of Navarrete, that a fourth existed at Madrid, seems to have been incorrect.

PROPOSED SLEDGE EXPEDITION ACROSS THE NORTH POLAR REGION.*

By ALFRED H. HARRISON.

The reason for preferring a sledge expedition is that the chances of success with a ship seem very precarious. Upon examining the course of the *Jeannette* very carefully, it would seem that her constant tendency was shorewards, and that her aberrations were due to accidental ice-pressures caused by the conformation of the land. Her reaching the latitude she did was therefore pure good luck. This southerly tendency of the drift might have been looked for from *à priori* reasoning, for we have records of the prevailing winds in these regions, and the currents of air seem to blow uniformly from the pole, and not towards it. However, the scheme of drifting a ship from the American coast across the Polar basin has received the official approval of this Society. It seems to me, therefore, that the difference between the chances of success of this expedition (namely, Captain Amundsen's) lies merely in the presence or absence of the ship, for my plan consists in planting a well-equipped and well-provisioned sledge expedition upon the ice. If the ship will drift a sledge party will drift, but if the drifting does not take place as is hoped, my expedition would still have facilities for movement which the ice-bound ship would not possess. However difficult or slow this movement may be, it is still something which a ship expedition cannot count upon. The driftwood on the shores on each side of the delta of the Mackenzie river comes down that river; is carried many miles out to sea and driven back by the prevailing winds. Apart from the drift, I still think that my chances of making good progress over the ice by means of dogs and men and wind are considerable. I have on the screen some photos of flat-bottomed boats which I intend to place upon the ice, and I hope to be able to move these by means of sails where travelling is good. These boats are built to carry any weight up to 10 tons in their journey down the Mackenzie—are regularly portaged across the Fort Smith portage of 15 miles, also across the Peace river portage of 18 miles, the road in both places being very bad. I have even known one of them to be taken from Peel river to the Porcupine river over the mountains by dogs. In dealing with sledges, 100 lbs. a dog is considered feasible even on a bad road, therefore with 100 dogs one should have 5 tons. I think, with the assistance of the wind and a large spread of canvas, that 33 dogs could move one of these boats where the road is good, and a road can be made at the slow rate of speed allowed for. I intend to start from Pullen island with 9 Eskimo and 100 dogs to cross the Arctic ocean to Spitzbergen, where I expect to arrive 912 days later. I shall carry instruments for taking soundings and other oceanographic observations, also instruments for surveying any land that may be found.

My estimate for food required per man is based on the following figures in grams per diem, which are given with others in Hammarsten's 'Physiological Chemistry,' fourth edition, p. 660:—

	Proteid.	Fats.	Carbo-hydrates.	Calories.	Authority.
Soldier, peace	119	49	529	2784	Playfair.
" field	146	46	504	2852	Hildesheim.
Labourer	130	40	550	2903	Molesschott.
"	133	95	422	2902	Forster.
English smith	176	71	666	3780	Playfair.
Swedish labourer ...	134	79	485	3019	Haltgren and Landergren.
My own allowance ...	150	200	600	4941	or $2\frac{1}{10}$ lb.

* Research Department, January 26, 1909.

It will be observed that while my estimate exceeds in almost every particular those above, it does so more especially in fat, a component especially required in cold climates. These quantities of food elements could be obtained in many ways, one of which is :—

Oatmeal	2 lb.
Fat	6 oz.
(Proteid plasmon)	1 „

From October, 1909, to March, 1912 (912 days), for 10 men :—

Oatmeal	18,240 lb.
Fat	3,420 „
Plasmon	570 „
	22,230 „

This is the total amount of necessary food for 10 men for 912 days, which can be eaten raw.

My estimate of the food required for dogs is based upon 'The Nutrition of Man,' by C. H. Chittenden, and upon my own experience, which has taught me that a dog can work in the Arctic Regions upon 2 lb. of fish per diem. Now, 4 oz. of oatmeal will make 2 lb. of cooked food, and, with fat and proteid, is more nourishing than 2 lb. of fish.

A dog's portion for one day :—

Oatmeal	4 oz.
Fat	2 „
Plasmon	1 „

From October, 1909, to March, 1912 (912 days), for 100 dogs :—

Oatmeal	22,800 lb.
Fat	11,400 „
Plasmon	5,700 „
	39,900 „

In my opinion this is the necessary amount of food for 100 dogs for 912 days, but I shall have more to say about a dog's portion which I cannot say here. Therefore we have—

For 10 men for 912 days	22,230 lb.
For 100 dogs for 912 days	39,900 „
	62,130 „

That men and dogs can live upon this food for 2½ years has never been put to the test of experience, and so I am of opinion that it is better and safer to add other extras, which would be as follows :—

Rice	1140 lb.
Sugar	1000 „
Dried onions	200 „
Dried apples	200 „
Tea	300 „
Chocolate	700 „
Coffee	300 „
Butter	200 „
Jam	500 „
Tobacco	100 „
Oil for fuel, allowing ½ gallon per day for 912 days	(?) 3000 „ approx.
Total amount of extra food and fuel	7640 „

We have next to consider the weight of the instruments and clothes, which is approximate.

23 Cook stoves and utensils made of tin	100 lb.
Clothes, allowing each man two suits a year	150 „
Blankets for making clothing	100 „
Linen for outside clothing	100 „
Extra clothes, boots, gloves, etc.	150 „
Boats, such as kayaks	200 „
Measuring tape, 2 sextants with Reeves' art. hoz. fixed, 1 mercurial art. hoz., 2 prismatic compasses, 1 aneroid, 6 thermometers (2 mercurial, 4 spirit)	50 „
Photographic apparatus	25 „
Books.—Hints to Travellers, 4 Nautical Almanacs, Roper, MS. books, field book, observation books, pencils, rubbers, etc.	50 „
Sounding apparatus ... ... between 200-	350 „
10,000 fathoms of wire 0·028 splicing material	150 „
4 deep-sea thermometers, 4 water-bottles, 2 dredging nets, 4 iron tubes for obtaining samples of the bottom ...	100 „
4 leads, 25 lb. each, for sinking wire	100 „
Medicine chest and bandages	25 „
Seal nets, twine for making nets, and axes	100 „
2000 cartridges, etc., for two rifles	100 „
1 shot-gun, with powder and shot	200 „
Harpoon gun and cart	100 „
	2000 „

This gives a total weight as follows:—

Food for men and dogs	62,130 lb.
Extra food	7,640 „
Clothes and instruments	2,000 „
	71,770 „

The problem before me is as follows: I have 72,000 lb. to move 150 miles in 182 days. I have one hundred dogs, which, at the rate of ten dogs to a sledge, gives me ten sledges in use, and each sledge will carry 1200 lb. I propose, by means of relays and return journeys, to move the whole of this material 0·82 mile each day. Ten sledges, carrying 1200 lb. apiece, will have to make six journeys in order to carry 72,000 lb. Therefore I shall have to go 0·82 mile six times each day and back. This will amount to 9·02 miles per day.

When I say ten sledges in use, I do not mean that I shall only have ten sledges. My entire supply of provisions will be carried on sixty sledges, and the dogs, after drawing ten sledges for 0·82 mile, will return for ten more loaded sledges. The dogs will therefore make only 4·92 miles each day dragging a load.

If all goes well by the end of six months, I shall have accomplished 150 miles and have eaten up eleven sledge-loads. This diminution of eleven loads will make my future journey less arduous, for in order to transfer the remaining 58,800 lb. at the same rate of 0·82 mile per day I shall only have to make five journeys per day. This reduces the amount traversed in a day from 9·02 to 7·38 miles per day.

At this rate, by the end of the first year, I shall have reached 75° N. lat., and the amount to be carried will have been reduced from 72,000 lb. to 45,600 lb. In the second I hope to reach 87° 30′ N. lat., or to travel 750 miles. This will mean

doing 2 miles per day. But on account of reduced loads I shall have to make only four journeys. Therefore, the average daily travel will be 14 miles. This means that the dogs must average 8 miles per day loaded for at least six months. At the end of six months another eleven sledge loads will be eaten, which leaves twenty-seven loaded sledges. This reduces the to-and-fro journeys from four to three. This means 10 miles a day, or 6 with loaded sledges.

During the next six months I hope to travel from 85° N. lat. to Spitzbergen, a distance of 750 miles. This means doing 4 miles a day with sixteen sledge-loads and one hundred dogs. For the first three months a journey of 12 miles per day will be necessary for some of the other dogs. But at the end of three months I shall only have ten and a half sledge-loads left and a drift of 2 miles a day with me, which will mean only travelling 2 miles a day.

In formulating the above plans I have made my own case appear as difficult as possible. If upon this presentment of the case the journey is considered feasible, I have great hopes that its actual accomplishment will be far easier than I have painted it.

Dr. STRAHAN (before the paper): This special meeting of the Research Department has been called for the purpose of enabling Mr. Harrison to lay before us his scheme for crossing the Polar ice. The scheme contains many novel points, and is open to a charge of rashness. It will be easily understood that the Society cannot give encouragement to an expedition which involves unusual risk without very careful consideration, and it is felt that nowhere could a proposal have better consideration or be more fully discussed than at a meeting of this Department. I will not detain you further, but will ask Mr. Harrison to place before you the essential features of his scheme.

Dr. STRAHAN (after the paper): You have expressed your thanks to Mr. Harrison for the exceedingly interesting communication he has made to us, and I think I am not wrong in saying that his scheme has, at any rate, the merit of boldness. I am not going to express any opinion of my own in this matter in the presence of experienced Arctic explorers, but will at once invite discussion. Perhaps Admiral Sir Lewis Beaumont will give us his views.

Admiral Sir LEWIS BEAUMONT: The object of the expedition as it is presented to the Society is to cross the Polar basin by means of sledges only, from land to land; and it involves a journey of 912 days with one white man, 9 Eskimo, and 100 dogs, carrying a weight of 72,000 lbs., loaded on 60 sledges, with only 200 lbs. weight of boats, which can only mean four kayaks, or two light collapsibles. The idea is to transport the whole of the men and the whole of the dogs, consuming the provisions on the way, for 1500 miles in the 912 days (two and a half years), during which there will be half the winter in 1910, the whole of the winter of 1910–11, and the whole of the winter of 1911–12 to pass through; so that it practically means travelling through 9 months of Arctic winter. The management of 60 sledges—that is to say, the handling of 60 sledges (it is intended to make them go in relays of 10 at a time) over Polar ice for that length of time with one white man to supervise and 10 Eskimo to manage the 100 dogs, is what I consider contrary to anything that former Arctic experience justifies.

Although, of course, one cannot help admiring the daring and the courage of any man who projects such an expedition, and is willing to undertake it, yet when the matter is referred to the Royal Geographical Society, and I am asked, as one who has been there, to give an opinion, I cannot help, feeling the responsibility of the Society in this matter, coming to the conclusion that the idea does not offer any reasonable hope of success.

Mr. HARRISON: You have not mentioned my boats; I would like to know what your ideas are about their being impracticable. I was told only about two days ago that these plans were wanted, and I got them out as quickly as I possibly could. Another thing: I do not know that I care to publish very much about how I am going to make use of flat-bottom boats; everything I say I can vouch for the truth of. I would like to know what it is you object to? Is it the night travelling in the Arctic?

Dr. STRAHAN: This meeting cannot consider anything except what appears on the printed statement.

Admiral Sir LEWIS BEAUMONT: I have in a few paragraphs formulated the objections for the sake of completeness and clearness, and in order not to be too long.

The expedition proposes to start from the land, no ship or depôt being established at either end, and devoid of water transport for a continuous journey of twenty-eight to thirty months across the Polar basin. During this period the number of men, dogs, and sledges already given are to be on the Polar ice without a fixed base for nine months of the Arctic winter night. They are to transport and consume provisions, clothing, and instruments, which amount at the outset to 72,000 lbs., or about 36 tons weight. Only one white man is to supervise, and nine Eskimo are to manage sixty sledges, which start loaded at a time of long nights and short days, that is, in October. Only oatmeal is to be the staple food for men and dogs for two and a half years; and only one hundred dogs are allowed for two and a half years, to cover a distance of 1500 miles.

During the time the expedition would be on the ice, only twenty months out of the thirty would be available, with full natural light, for sounding and scientific work; and only one trained observer would be there to carry out all the records while on the march. The idea of a continuous journey across the Polar basin by sledges, which would include two and a half winters travelling at a temperature below −60° Fahr., is contrary to all previous Arctic experience, and, as I have said, does not offer a reasonable prospect of success.

This is rather the broad statement of the objections to the expedition. Now to confirm them, because I do not, of course, pretend to be sufficiently experienced in Arctic exploration to be able to say so much out of my own knowledge, all that I can do is to tell you that I have actually seen and travelled over the Polar pack, seen its vicissitudes, and the changes which occur constantly in the ice. I know when I read Peary and Cagni that the experiences they record are absolutely correct; that what you learn from them of the difficulties they met are undoubtedly the difficulties which will be met again. Now, I have extracts here from Peary's last journey, and though it may have the effect of keeping you here a little longer, yet I think it would be certainly useful so far as to make you understand what a struggle, what arduous and strenuous work being on the Polar ice at all is. Hitherto a journey over the Polar pack has been looked upon as one great and continuous effort. You start with a desired object, you are carried on with the enthusiasm with which you have undertaken the expedition, and you make a tremendous effort to get as far as you can, and when you have got as far as you can, it then becomes one tremendous, arduous effort, for your life, to get back again. During their expeditions Peary and Cagni have never been anything like 912 days on the Polar pack. Their time on the Polar pack was: Cagni 105 days, and Peary 47 days on the outward journey; the time coming back he does not give. He has become now so experienced and thinks so little of his return journey that he does not give you details. He gives them going out in order that you shall know how far he has got, but not the details going back. He only says, "Starting back

on April 21, I got to the ship in June." But the journey out resulted in his reaching lat. 87° 6′ N. in forty-seven days; that is to say, he made 253 miles in those forty-seven days, at the rate of 5½ miles a day nearly. During that time he was nine days stopped by the wind, and he was six days stopped by open water. It seems that when he got beyond that last stoppage by open water he travelled some days, as he tells us, 30 miles. Well, that shows you how an average can be recovered, but it also shows that the ice, even in those high latitudes, is thin and new, therefore it is easily broken up; and in the winter the probability is that it is broken up, so there is no security even in winter of any kind of continuous travelling, and anybody who makes exact calculations as to travelling 10, 5, or even 2 miles a day is apt to be very much disappointed when he arrives, as Peary did, on the bank of what he called the Hudson river, so long and broad was the channel, and remained there for six days. That in the daylight is bad enough, but what it would be in the Arctic night is almost inconceivable; because, as you know, though the moon gives you light for a fortnight at a time, if clear, the other fortnight is absolute and total darkness in those regions. Again, the temperature during Peary's journey was almost constantly, during the outward journey, −60° Fahr. All I can say is that that is a terrible cold, the continuance of which taxes the powers of endurance of any one to the utmost while sledging. When you look upon Peary's performances, you must take into consideration his great experience, his continuous life in the Arctic. He has been there now for nearly fifteen years; he has almost grown to be an Eskimo; he knows their language, he knows their ways, and by successive attempts he has induced them to trust themselves with him on the northern ice; but even they finally refused to go any further on his last attempt. They said they wanted to go back, they would not go further. He says himself that on April 21, when he got to 87° 6′ he knew that he could not take them any further. He would have liked to have gone on with his one empty sledge, and made another dash for 30 miles, but he knew he could not take them with him. Well, that is, I suppose, the very best Polar ice travelling that can be quoted. Cagni's was excellent. A clearer, harder headed man never went to the Arctic; read his description of his coming back! What a struggle, what an effort that was! Now, Cagni was forty-five days going out; his return journey took him sixty days. He reached lat. 86° 34′ N. He accomplished 287 miles. Still the remaining distance to the pole was 206 miles. The total distance he covered in those 105 days was 753 miles, and that was a splendid record.

Now, the load on the sledges of these travellers is considered to be heavy if over 600 lbs. It must be remembered that all those sledges were of native type, except in the case of Cagni, who used sledges made in Italy, but every time Peary has gone, he has taken Eskimo sledges, and I do not think any Arctic explorer who has gone over Polar ice would say that a better sledge for the work could be got than the Eskimo sledge. If that is the case, even Peary himself would say that for work over Polar ice he daren't load his sledges to more than 600 lbs. Cagni says 550 lbs., it is therefore expecting too much to have a load of 1200 lbs. on the sledge, as is intended in this expedition.

Again, Peary himself, though so fully acquainted with the Eskimo as to have their absolute confidence, has never yet been able to trust any party of them on the Polar ice without a white man. All his parties had somebody in command, from which I gather that an Eskimo is not to be trusted independently. Our own experience of Eskimo was, that they were so timid, so superstitious about the northern ice that they would not go there at all. Peary has overcome that with those whom he employs, but still he himself does not trust any subsidiary party of his unless there is a white man in command. To give you an instance of how difficult it is to

secure continuity of marching amongst the changing conditions of the ice, the half of the supplies which Peary expected were stopped at the Hudson river, and he had to go on without them; and one party, commanded by an American called Clark, which had crossed it, was unable to reach land again; they found their way with much difficulty across the ice to Greenland, and thinking they had struck the west coast of Grant's Land, they were going north to regain their depôt, and would have been lost had not they been found by Peary on his way back. This is an indication of the difficulty even in daylight of either continuing your road in one direction, or of returning to any fixed point. In Cagni's expedition, if you remember, the very party that was to return first was actually lost. I forget the name of the lieutenant and the two men, but he was detached after having assisted Cagni's first stage, and left with orders to go back to the ship, but was never heard of again. What happened it is impossible to know: it is quite possible that the party missed the island. In a fog it is quite easy to do so, and sometimes the fogs continue for days.

I think I have given you now sufficient figures and data to show that to attempt anything like the prolonged expedition over the Polar ice of a large party, burdened with the whole of its supplies, and having nothing to fall back upon during the long period of 912 days, which includes 9 months of night, is really contrary to and not justified by the experience which has been gained, even by such constant travellers in the Arctic regions as Peary, and by such fine daylight journeys as were accomplished by the Italian Commander Cagni.

Colonel FEILDEN: Sir Lewis Beaumont has entered so fully into the experiences of travelling over the Polar ice, that I have little to add; yet, having wintered in Ellesmere Land, as far north as nearly 83°, it seems to me impossible that men could conduct sledges or live on the ice at that time of the year. The sun is below the horizon at 83° for nearly 5 months, and during the periods when there is no moon, and when it is obscure and no stars visible, it becomes as dark as unlighted coal-pit workings. There is a difficulty even to go 100 yards from the ship, say to the magnetic house, or to draw water out of the fire-hole. You know it is only a question of fighting the wind and cold for a few minutes or a quarter of an hour, and yet you feel as if your very heart was going to stop with the blowing of this terrible cold wind and the darkness. If you turn to Peary's last book, 'Nearest the Pole,' he wintered at Cape Sheridan, 4 miles from the winter quarters of the *Alert* in 1875–6. He mentions how, during a period of darkness, one man who fell into a crack a few yards from the ship, lost his bearings and he was a long time before he could get back to the ship a few yards away, while the Eskimo also lost their bearings, and it was a long time before they could make the ship, and that in a place they knew perfectly well. During these periods of darkness you cannot take any observations; and how are you to find, on the drifting Polar pack, where you are? It is not an agreeable task to throw cold water on the scheme of a gentleman who has shown such courage and powers of endurance; and having read his book through carefully, it seems to me that Mr. Harrison has no actual experience of the Polar pack further than having gone a short voyage in August from Herschel island towards Banks Land in a whaler and back again. His winter experiences were in the delta of the Mackenzie, which after all, you must remember, is only in the same parallel of latitude as the flourishing town of Tromsoe, so that even on the shortest day of the year in the delta of the Mackenzie, there must be an appreciable amount of midday twilight, and no doubt it is quite possible to travel in the delta of the Mackenzie; but I am quite sure that if Mr. Harrison was to attempt going across the Polar pack during the Polar night, it would end in a tragedy. I agree with all Admiral Sir Lewis Beaumont has said.

Major DARWIN said they all recognized that Mr. Harrison had already spent

much time and money on Arctic exploration, and that the plan now before them had involved a great deal of thought. It was very unpleasant to have to throw cold water on an explorer who was filled with such fine enthusiasm, and who had shown himself so willing to face very great danger. But in such cases experts were bound to speak the literal truth as to their opinions. He hoped, however, that Mr. Harrison would see that this criticism was made in the most friendly spirit towards himself. If he should ever be disposed to reconsider his schemes in consideration of this friendly criticism, the Society would be only too glad on their side to reconsider their criticisms.

Mr. HARRISON: I accept your criticisms, and I am very glad to hear them; I take them in the very best possible spirit, and do not consider they come with any bad feeling towards me. I have nothing whatever to be ashamed of, and I do not mind who sees my plans. My plans are honest, and they are the best I can do. No one here has had my experience in the Arctic. I am not surprised at all that you should think, with the experiences that you have had, that it is impossible for a man to travel in the Arctic night. I have never been into 80° or 83° N. lat., but I have met natives at Slave lake who have only been into 58° and 60° N. lat., who had forgotten a great deal more than I knew at the time I came out of the country, and I do not think the latitude one gets into has very much to do with the question. Of the people who have succeeded in polar exploration, we have heard from Admiral Sir Lewis Beaumont that Commander Peary was nothing more than an Eskimo. He has really got nearer the Pole than any one else, and why? In my opinion, because he has made use of the Eskimo; and the reason why he has never done better is that he has always been making a dash for the Pole. I have no idea whatever of making a dash for the Pole. And it is on account of the dash, together with the fact that he has returned by the same route, that he has not reached the Pole. I think it must be allowed, as I stated before, that if Commander De Long had placed a sledge expedition north of Herald island, there is no doubt the *Jeannette* party would have accomplished more than the *Fram* and *Jeannette* jointly accomplished. I do not think any one can say that would not have been the case. There is nothing in the ice, and no one can prove there is anything in the ice, to bring an expedition put down on the ice to grief. I do not say that a man is going to move his supplies over such a surface with any rapidity. I mean that there are bad places in the Arctic ice where supplies could not be moved 100 yards a day, but there must be many places in the Arctic regions where 20 or 30 miles in a day can be travelled, and it is the mean of these journeys one must calculate upon. Peary's journey, which Sir Lewis Beaumont has referred to as accomplished in a temperature of −60° the whole time, shows us he was going towards a very cold region, and I believe that the Pole will be found to be the coldest region in the Arctic ocean. I have experienced 68½° below zero. I had four thermometers set up in a properly built thermometer house—one at 72° below zero and one at 70° and two at 68½°, and on that day, unless I had known what the temperature was by a thermometer, I should have gone out without a coat on. As a general rule, there is very little wind with a cold like that. Travelling in England, a man would always be able to see a ditch by the light of the snow if he was crossing a field with the snow on the ground, and I think you will find, if you are driving along a road even on the darkest night, though there may be no hedges by the side, you will see a ditch quite plainly, the light is so good from the snow. I have travelled in really very much more dangerous places than the Arctic ocean, in places where you meet warm springs coming up in the middle of frozen lakes.

Cagni again is another explorer who made a dash for the Pole. I think his journey is certainly the finest ever performed over the Arctic ice; but, at the same

time, if he had not made that dash, he would have accomplished a great deal more than he did. Colonel Feilden has referred to the fact that the Arctic night is like the interior of a coal-pit. I have just told you what I think about the darkness even in this country, and I am sure you get it much darker at home than in the Arctic. He also asks the question, How are you to know where you are going on the Arctic ice? I suppose there are many sailing ships that are becalmed at sea and driven about in different directions, and they can find out where they are. A man must carry chronometers and sextants, and with the stars I think he ought to be able to find his way. He has also got a compass, but there may be difficulties there I do not understand. We could not have a better instance of the way in which he drifted about than Captain Mikkelsen, who explains how he thought he was in one place and found himself by observation in another. With regard to the ancient wood that was found upon Banks' Land, I saw no vestige of wood where I was. The ancient wood which is found there and on Prince Patrick's island—at a certain period I believe that the Mackenzie river really came down to Liverpool bay, and the course of the river was different from what it is to-day, but that wood was brought there when these islands were under water. You can see islands built up in the delta of the Mackenzie river in one year by driftwood sticking in the sand, and then a big pack of ice coming down and piling mud upon the driftwood.

I have no more to say about it; I am very glad indeed that you have given me this meeting to receive your criticisms; it is a great help to me, and what I particularly asked you for.

THE ISOHYETS 'TWIXT SAHARA AND WESTERN SUDAN.*

By ALEXANDER KNOX.

The rainfall in this sub-desertic region is one of the many interesting problems which have forced themselves into notice during the process of constructing new rain maps of Africa, and it will be sufficient for the purpose in hand if we consider the circumstances with reference to three main guiding positions, namely, St. Louis, the Niger bend, and Chad.

And first with regard to St. Louis. There is, I think, every reason to believe that the annual precipitation has, for many years, been gradually growing less. M. Courtet, in his 'Etude sur le Sénégal,' gives an old ten-year mean for the period 1830–1839, viz. 600 millimetres, or 23·62 inches, as well as a twenty-one year mean of 440 millimetres, or 17·32 inches. Dr. Supan,† quoting from Dr. Hahn, places the mean for twenty-six years at 422 millimetres, or 16·61 inches, while Dr. Fraunberger‡ gives a thirty-three year mean as 402·8 millimetres, or 15·97 inches.

Since the publication of the last figures, we have those for 1904 and 1905 issued by the new Service Meteorologique§ of French West Africa, and we also have the 1903 total, which may or may not have been included in Dr. Fraunberger's mean. We can thus arrive at a thirty-six year mean of 390·9 millimetres, or 15·39 inches. It appears, therefore, that the longer the period, dating from the earliest observations, the less is the mean—a fact which, I think, upholds my original statement.

Further, I have the complete set of figures for the fourteen years ending 1905,

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* Research Department, February 18, 1909.

† *Petermanns Mitteilungen*, Ergänz. No. 124, 1898, p. 75.

‡ *Ibid.*, Band 52, IV., 1906, p. 80.

§ 'Gouvernement Général de l'Afrique Occidentale Française.' Service Météorologique. Paris: 1906.

the annual mean for that period being 348·3 millimetres, or 13·71 inches; and in all these fourteen years the old ten-year mean was not once reached, the twenty-one year mean only on two occasions, and the thirty-six year mean only three times.

Now, if we compare the accounts of Mollien,* in 1818, and of the celebrated Governor Faidherbe,† as late as 1858, with the book recently published on the St. Louis–Dakar railway, and with Dr. D'Anfreville's article in last year's *Revue Coloniale* (p. 203), we see at once that the thickly wooded country of the older writers has become *plate et déboisée*. In fact, the last-named author says, "The forests which compelled the wonder and admiration of our forefathers—these forests are no more." And the rainfall is surely reflected in the vegetation, a point on which Dr. Fraunberger insists, as we shall presently see.

The question therefore arises, "Would it not be more accurate to strike out the results of the earlier years, and include, for the purpose of obtaining the mean, only, say, the last fourteen years?" The older observations may have been perfectly accurate, but that is not my point. My point is that we shall obtain a more trustworthy indication of what may be expected nowadays, if these older observations be excluded. In dealing with Africa, we have, as a rule, to be thankful for small mercies, and I find that in every single instance where means have been struck, every investigator has always included all the figures he could lay his hands on, and I feel, therefore, that there may be a certain amount of heresy in the above suggestion, but where heresy and truth are so closely allied, to the exclusion of orthodoxy and error, I trust I may be pardoned.

The adoption of this period of fourteen years has, in my eyes, a very strong support in the fact that I have all the details for those years, whereas the older figures are merely quotations, which, of course, may be accurate, but which I have no means of checking.

Next, as to the Niger bend region. The three latest rainfall maps are those of Dr. Herbertson‡ (1901), Drs. Sievers and Hahn§ (1901), and Dr. Fraunberger‖ (1906). The last named takes Dr. Herbertson to task for drawing a simple arc, as a rain curve, in this region, for which the information available was of the scantiest, and says it breeds distrust, he himself pinning his colours to the 'Florenkarte' of Dr. Sievers, for which there was no more information, except along one route, namely, that followed by Caillié in 1828 and by Oscar Lenz in 1880. This map appeared in 1891. The former traveller found the country absolute desert, except for a few stunted mimosas near Timbuktu. Pursuing the same route in the opposite direction half a century later, Lenz found the halfa grass region to begin at about 20° N. and extend southwards, and it is so marked on his map. The mimosa bush he found to extend from El Amugdar to Timbuktu. The 'Florenkarte' ignores this, the only valuable information, disregards the halfa grass altogether, and limits the mimosa bush (presumably included in the savannah zone) to the immediate neighbourhood of the Niger bend on the north. In the second edition brought up to date by Dr. Hahn (1901), when there was no more information, the savannah region is extended further north so as to reach about 100 kilometres north of the bend. But, singularly enough, the rain map in the same volume, for which further information *was* available, remains unaltered.

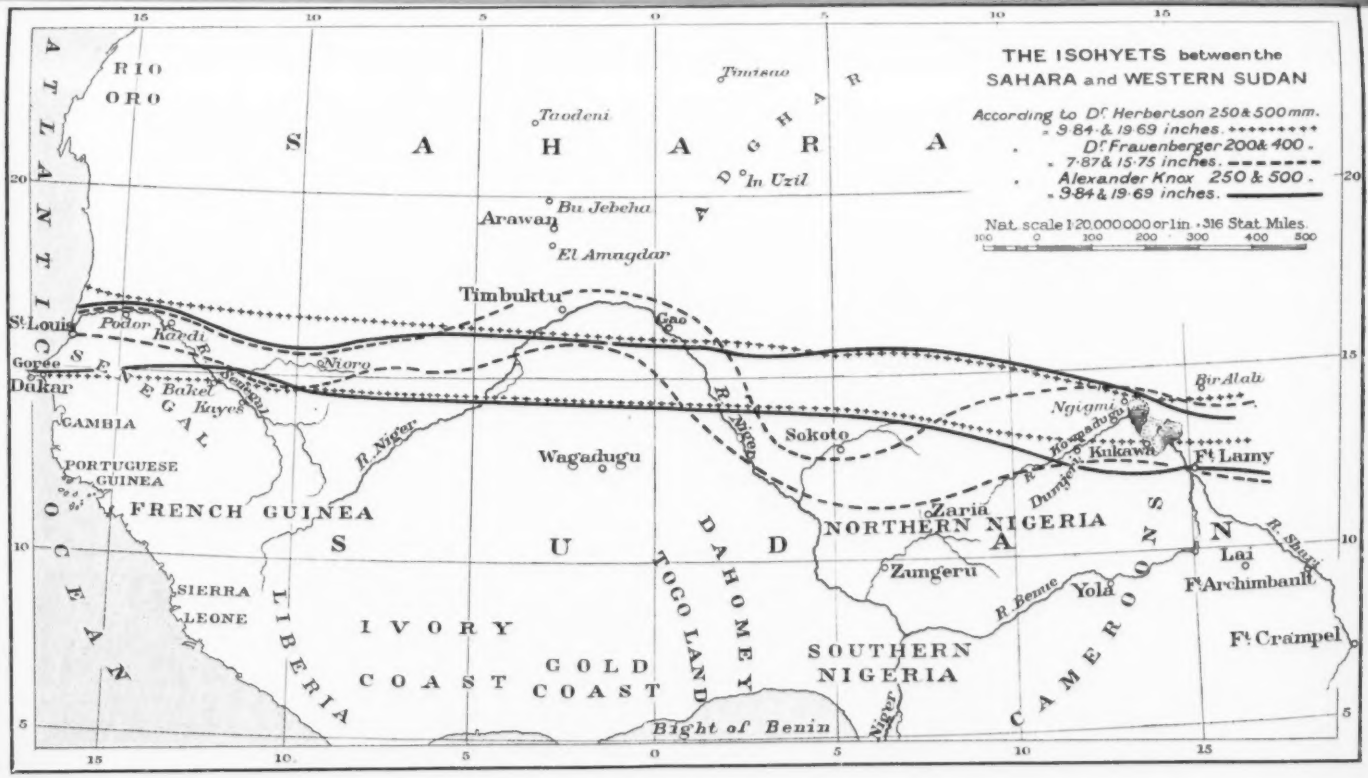
* Mollien, 'Découverte des sources du Sénégal et de la Gambie, précédée d'une notice sur l'auteur par L. Ravaisson-Mollien.' Paris: 1889.

† Faidherbe, 'Le Sénégal. La France dans l'Afrique Occidentale.' Paris: 1889.

‡ Herbertson, 'Distribution of Rainfall over the Land.' London: 1901.

§ Sievers-Hahn, 'Allegemeine Länderkunde.' Afrika: 1901. (Reprinted 1903.)

‖ *P.M.G.*, Band 52. 1906.


THE ISOHYETS between the SAHARA and WESTERN SUDAN
According to Dr Herbertson 250 & 500 mm. = 9·84 & 19·69 inches.
Dr Frauenberger 200 & 400 = 7·87 & 15·75 inches.
Alexander Knox 250 & 500 = 9·84 & 19·69 inches.
Nat. scale 1:20,000,000 or 1in = 316 Stat. Miles.
100 0 100 200 300 400 500
ATLANTIC OCEAN
RIO ORO
SAHARA
Tindaf
Taodeni
In Uzil
Bu Jebeha
Arawan
El Amagdar
Timbuktu
Gao
St Louis
Podor
Kaedi
Gorée
Dakar
Baker
Kayes
Bakel
Niora
Bamako
GAMBIA
PORTUGUESE GUINEA
FRENCH GUINEA
SENEGAL
R. Niger
Wagadugu
Sokoto
Bir Alali
Ngigmi
Kukawa
Ft Lamy
Zaria
NORTHERN NIGERIA
SUDAN
Zungeru
Yola
Lai
Ft Archimbault
Ft Crampel
SIERRA LEONE
LIBERIA
IVORY COAST
GOLD COAST
TOGO LAND
DAHOMEY
SOUTHERN NIGERIA
CAMEROONS
Bight of Benin
Niger
R. Benue
R. Shari
15 10 5 0 5 10 15
20 15 10 5

Dr. Fraunberger says that his rain curve here is made to follow the northern limit of what Dr. Sievers calls the "Halfa Uebergangsregion" (which does not exist on the map), and that he follows the southern limit of this zone in Algeria and Tunis (where it does exist on the map). What Dr. Fraunberger really does follow, near the Niger bend, is the northern limit of the savannah zone, which is given a position contrary to the only evidence existing at the time. It is therefore a matter, really, of the blind leading the blind. By this method the country immediately north of the bend is given from 200 to 400 millimetres of rain annually.

We now have further information with regard to the area under consideration. In 1904 Théveniaut* went from Timbuktu along the north bank of the Niger, and then turned in a north-easterly direction, and made for what is now called Adghar, and met Laperrine not far from Timisao. In 1905 Gautier† traversed the Sahara from north to south, and, passing through Adghar, made for Gao. In 1906 Cauvin‡ and Cortier§ went northwards from Timbuktu, not by the Caillié-Lenz route, but a trifle to the east, to Bu Jebeha, and thence to Arawan, on their way to Taodeni; while in 1907 Arnaud‖ and Cortier descended through Adghar to Gao.

We learn from Cauvin and Cortier that the real Timbuktu mimosa forest now ends abruptly 25 kilometres north of that place, and that after that the trees are few and far between, and soon cease altogether. We know from records taken nine months in 1897, twelve in 1898, ten months in 1899, nine months in 1900, five months in 1901, and ten in 1902, that the mean annual rainfall at Timbuktu is 218·1 millimetres; and yet Dr. Hahn, in his 1901 map, gives it between 500 and 750 millimetres, when at least the records for 1897 to 1899 were available. We further learn from M. Gautier, and his evidence is corroborated by others mentioned above, that journeying from In Uzil, in Adghar, to Gao, on the east side of the Niger bend, that he passed for 400 kilometres through mimosa bush, not thick bush, but open forest, with fine grass—not stunted mimosa, but good shade-giving trees. The savannah region should now, therefore, include this forest. For the purpose of constructing a rain map, the question then arose, "What amount of rainfall is to be given to this forest and that north of Timbuktu?" I first consulted Mr. W. B. Hemsley, Keeper of the Herbarium and Library at Kew, and his opinion was that these mimosa (*acacia*) forests do not necessarily require a rainfall of 200 millimetres, provided there be water not far from the surface. In fact, the *Acacia arabica* in the lower Indus valley is exposed to as great changes of temperature with a rainfall of only 5 inches (127 millimetres); but then the Indus overflows its banks.

I then entered into correspondence with M. Gautier, who is a geologist, and knows his Algeria well, and he informed me that this forest occupies an Eocene area, and the existence of clay at no great depth keeps the water near the surface even in the dry season, when it is obtainable with no great difficulty, while in the rainy season it collects and remains in surface pools. M. Gautier, further, compares the sub-desertic region of the Sudan with the sub-desertic region of the Mediterranean—that is, with the southern highlands of Algeria, where the armoured halfa grows, and adds that the Algerian zone, with xiraphil vegetation, nowhere receives a greater rainfall than 200 millimetres as a maximum. It appears to be very

* Caillié, 'Travels through Central Africa to Timbuctoo.' London: 1830.

† Lenz, 'Timbuktu.' Leipzig: 1884.

‡ *La Géographie*, 1905, vol. **11**, p. 461; vol. **12**, p. 263; 1906, vol. **13**, p. 5; vol. **14**, pp. 308, 317.

§ *Bulletin du Comité de l'Afrique française*, 1904, p. 309; 1907, p. 433. Supt. No. 4 (map).

‖ *Annales de Géographie*, 1907, p. 46.

probable, therefore, that the halfa and mimosa area does not receive 200 millimetres of rainfall.

In going from west to east Dr. Fraunberger too soon gives up his allegiance to the 'Florenkarte,' or he would have been nearer the mark as regards Sokoto, which he gives a precipitation of less than 200 millimetres, whereas we now know that, from a four-year mean, the mean annual rainfall there amounts to 27·99 inches, or 711 millimetres.

And now as to the Lake Chad area. Dr. Herbertson gives Chad, including, I think, Kukawa (which is not plotted) between 250 and 500 millimetres of rain; Drs. Sievers and Hahn place the whole of what was the lake and the country away to the north-west in the layer having a precipitation of between 750 and 1000 millimetres; while Dr. Fraunberger gives from 200 to 400 millimetres to the whole region from north of Ngigmi on the north to Fort Lamy on the south.

In the *Meteorologische Zeitschrift*, 1903, p. 474, is unearthed the rainfall, registered in 1854 by Corporal Church, one of the two sappers told off to accompany Vogel, and an estimate of the number of rainy days in the rainy season (July, August, September) is made from the records of Denham in 1825, Rohlfs in 1866–7, and Nachtigal; but, unfortunately, Barth's record is omitted. If this be included, we find that altogether there are forty-two rainy days in this period, divided as follows: seventeen in July, fourteen in August, and eleven in September. This, of course, is like the clinging of the drowning man to the straw, but it is the only information available.

If reference be made to the letters of Vogel * to the Consul at Tripoli, and to the Foreign Office, it will be seen that the total rainfall for the year amounted to 21 inches, and that for the rainy season to 19·5 inches. Barth † considered that this was too low a figure for the neighbourhood, however right for Kukawa.

Now, in the *Zeitschrift* these figures are correctly stated. But 21 inches are converted, in the *Zeitschrift*, into 352 millimetres, and 19·5 inches into 327 millimetres. Dr. Fraunberger adopts these statements without question, restates them in his article in *Petermanns Mitteilungen*, and acts on them in his map, which is therefore here in error, for 21 inches are equivalent to between 533 and 534 millimetres, and not 352, and 19·5 inches are equal to between 495 and 496 millimetres, and not 327.

In going northwards, as the 9th and 10th parallels are neared in this region, the descent from the Sudan rainfall to that of the Sahara becomes abrupt. In the neighbourhood of 6° N., the dry season lasts scarcely a month; at Fort Crampel in about 7° N. it extends over two and half months; at Yola, to the north of 9°, it extends over five months; at Forts Archimbault and Lai, to the south of 10°, it covers nearly, if not quite, half the year, while at Kukawa the rainy season lasts only three months. Again, south of 7° N. we have some 110 rainy days in the year; at Fort Archimbault and Lai only 76 and 88 respectively, between 40 and 50 at Kukawa, and only 14 at Bir Alali, to the north-east of Chad.

If we give to Bir Alali ‡ the mean daily rainfall during the rainy season at Kukawa—to which it is not really entitled—we have as the annual precipitation 165·2 millimetres. Are we, then, to cling to Vogel's fifty-year-old record for one year? No other figures are forthcoming, but we learn from all sources that the rainfall in that region has diminished considerably. Indeed, the *Scottish Geographical Magazine* has it that in 1907 the rainy season consisted of one day. That,

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* *Proceedings of the Royal Geographical Society*, vol. **25**, 1855, pp. 241 *sqq.*

† Barth, 'Travels in Central Africa,' vol. **3**, chap. xxxviii. p. 3.

‡ Rouget, 'L'Expansion coloniale au Congo Français,' p. 273. Paris: 1906.

I presume, is exceptional. We have, however, a two-year mean at Dumjeri, on the Komádugu Yobe abreast of Kukawa, which amounts to 17·12 inches, or 435 millimetres. And I incline to the opinion that Kukawa does not now receive a mean annual rainfall in excess of this.

APPROXIMATE POSITION OF PLACES MENTIONED.

	Lat. N.	Long.
Arawan	18° 58′	3° 0′ W.
Bir Alali	14° 20′	15° 13′ E
Bu Jebeha	18° 24′	2° 10′ W.
Dumjori	12° 45′	12° 0′ E.
El Amugdar	18° 32′	2° 58′ W.
Fort Archimbault	9° 9′	18° 27′ E.
Fort Crampel	7° 9′	19° 12′ E.
Gao	16° 13′	0° 20′ E.
In Uzil	20° 43′	2° 20′ E.
Kukawa	12° 55′	13° 35′ E.
Lai	9° 24′	16° 21½′ E.
St. Louis	16° 1½′	16° 30½′ W.
Sokoto	13° 2′	5° 14½′ E.
Taodeni	22° 40′	4° 10′ W.
Timbuktu	16° 43′	2° 40′ W.
Timisao	21° 52′	3° 0′ E.
Yola	9° 12½′	12° 29½′ E.

MEAN ANNUAL RAINFALL INFLUENCING THE ISOHYETS.

(*The figures in brackets are the numbers of years.*)

		mm.
On the coast	St. Louis (36)	390·9
	,, (14)	348·3
	Dakar (7)	484
	Goree (12)	521
On Senegal river	Podor (5)	324
	Kaedi (1)	500
	Bakel (2)	704
	Kayes (7)	717·6
15° 15′ N., 9° 20′ W.	Nioro ($\frac{1}{1}$)	>262·1
On Niger river	Timbuktu (6)	218·1
12° 15′ N., 1° 9′ W.	Wagadugu ($\frac{31}{32}$)	777
13° 2′ N., 5° 14½′ E.	Sokoto (4)	711
9° 48½′ N., 6° 9½′ E.	Zungeru (5)	1130
11° 6′ N., 7° 43′ E.	Zaria (3)	1201
12° 55′ N., 13° 35′ E. ...	Kukawa (1)	533
9° 24′ N., 16° 21½′ E. ...	Lai ($\frac{11}{12}$)	>1117
9° 9′ N., 18° 27′ E.	Fort Archimbault (1) ...	1069

Dr. STRAHAN (after the paper): Our thanks are due to Mr. Knox for investigating a subject which is obviously extremely difficult, and which has involved great labour in the collection of evidence. My sympathies are rather with Dr. Herbertson in the matter of averages. His isohyetic lines seem to be the best he could have drawn under the circumstances. However, I will at once invite discussion.

Dr. SHAW: The details of the rainfall of the part of Africa referred to by the author of the paper are matters which only an expert on Africa can make anything of, and that I do not pretend to be. It is a very interesting region, because it is on

the steep gradient of rainfall between equatorial abundance and the "no rainfall" of further north; consequently, it must be a region for which data will be fluctuating, and for which certainty can only be arrived at with an abundance of data that are not likely to be obtained in the immediate future. With regard to the drawing of isohyets for such a region, I may say that 63, Victoria Street would be almost scandalized at the suggestion that such an operation was permissible at all. I don't know what Camden Square would think of it, but certainly we should say that the only thing to be done is to complain of the lack of data, and regret that nothing more is justifiable. However, the bolder practice leads to an interesting discussion, and has a good deal to recommend it, in spite of the fact that when all is said and done the lines drawn cannot be regarded as final. What I would have liked is that Mr. Knox, in putting these things down in his paper, should have been good enough to give the latitude and longitude of the places he mentions, and at the end should have added a table of the data which he uses in this paper. What strikes one immediately is that it would be desirable, at any rate, to compare rainfalls of corresponding periods. To compare fourteen years of rainfall for one place with two or three years of rainfall at another place is a speculative operation, even if the longer period includes the shorter. The first requisite is that the periods should be identical in years. Of course, to make a temporary map, one is obliged to use periods that do not correspond. That is a misfortune to which the investigators of the rainfall of this part of Africa have, I presume, to submit.

With reference to the use of the vegetation to indicate the rainfall, if sand is being transferred in any considerable quantities, the vegetation is likely to be affected by the transference although the rainfall remain the same; therefore to draw a conclusion from the disappearance of a particular kind of vegetation is not necessarily justified if the transference of sand may produce the effect. One knows that in certain parts of Africa the whole situation has been changed, not necessarily by the alteration of climate in itself, but by the mechanical effect of the burying of regions in sand. Mr. Knox has done valuable and useful service in bringing the subject forward.

Dr. Mill: I think Mr. Knox deserves very great credit for the courage with which he has tackled a task that those, perhaps, who deal most largely with maps of the kind would have abandoned as hopeless after a preliminary survey; and it is a striking side light on the exploration of Africa that a paper should be offered to this Society on a point of such a kind, when those of us who have known the Society for only a comparatively short number of years remember well how the largest features of the hydrography and the configuration of this region were almost blank not very long ago. I am sorry Mr. Ravenstein is not here, because he has studied Africa and the cartography of Africa in all its aspects more fully than any one else in this country, and he has struggled with the interpretation of the records of the meteorological observations in tropical Africa.

It seems to me, looking at the map put before us by Mr. Knox in a large way, that the two sets of lines which he has been criticizing and correcting run creditably close to each other. They are separated by approximately equal intervals. They cross each other in such a way that Dr. Herbertson's red lines form a very fair mean of the more ambitiously detailed blue lines of the German professor, and I think that in all probability Mr. Knox's fainter lines approximate very closely to what may be found to be the truth. But I should not be at all surprised if, as Dr. Shaw indicated, the actual run of these isohyets varies greatly from year to year, and from short period to short period; because in our own country, where the extremes are less, we find that even for periods of ten years you may get rainfall maps of the British Islands differing very considerably one from another. Hence I think it is not at

all unlikely that all three workers in this case, considering the extreme scarcity of data and the extreme uncertainty of such data as exist, are approximately within the same distance of the truth, and, looking to all the conditions, the approximation is about as close as we are likely to get for a good many years to come. If it were put to me to construct a rainfall map of this region, I should try, first of all, to find out the relative value of the original data, and not attempt a degree of precision closer than the probable limits of error. Observers in tropical Africa are subject to innumerable difficulties of climate, health, and distraction, and they cannot be expected to attain as high accuracy as observers may reasonably hope to reach in this country, and it is a question whether the work done will bear the somewhat exacting discussion to which they have been subjected in this case.

I congratulate Mr. Knox upon detecting the *Meteorologische Zeitschrift* in a numerical inexactitude; that is a triumph of which any meteorologist would be proud. I am anxious to hear what Dr. Herbertson has to say; I can only speak on general principles, but he has had actual experience of all the practical difficulties.

Dr. HERBERTSON: Mr. Knox and I, greatly daring, have not followed in the footsteps of the meteorological angels but have rushed into the difficult problems of African rainfall. It is quite impossible, however, to do more than roughly suggest isohyetal lines when there are only three rainfall stations for an area such as that represented by the map on the board. On my map the lines were dotted, to show that they were more or less guess-work. We are very much indebted to Mr. Knox for undertaking a closer investigation of the trend of the lines, because in hot regions rainfall is by far the most important meteorological element from an economic point of view. Consequently any rectification of the rough lines which have been put down previously is very welcome. In this region, vegetation must be taken as the best indication of rainfall, but vegetation has to be interpreted with great caution, as Mr. Knox has pointed out. The water supply of plants comes from the soil as well as from the atmosphere, and I should say, speaking generally, if there are patches or long strips of vegetation in a low-lying country they usually indicate abundance of ground water in those particular patches or strips; but on higher ground they usually indicate areas where the precipitation is slightly higher. I regret that Mr. Knox has confined his attention to-night to so limited an area. I had hoped that he would have given us a new rainfall map of Africa, based on a very careful analysis of the meteorological observations, as far as they are available, and on his knowledge of the geology and of the vegetation of Africa. He possesses the minute and critical knowledge of those three elements which should permit him to draw a more accurate and detailed rainfall map of Africa than any one has yet done.

One point I should like to emphasize, viz. the importance of having in every one of our colonies a very careful vegetation survey. This is even more important than a geological survey in a new colony, especially in the part of the world between the desert and the dense forest where there are successive belts of very different economic value. In order to interpret the vegetation map properly, it would be necessary to set up meteorological observatories at certain stations, and to compare very carefully the meteorological conditions required for typical plants in each natural plant formation. When the meteorological conditions for a particular type of natural vegetation obtained in two or three districts are found to resemble each other, then it would be possible to say that probably those meteorological conditions would also be found where this vegetation was found. In this way vegetation could be used more precisely for mapping rainfall, which is the most important variable element of the hot lands.

Before sitting down I should like to echo Dr. Mill's remarks about the

indebtedness of all students of African climatology to the work of Mr. Ravenstein, and also to thank Mr. Knox again for this new contribution to the subject.

Dr. EVANS: There is one aspect of the subject which has been dealt with by the author, but which none of the other speakers has touched on: the supposed change of the rainfall during the period covered by the observations which have formed the subject of the paper.

Mr. Knox gives us to understand that the data are sufficient to show a progressive decrease in the rainfall, which cannot, I believe, be paralleled in any other part of the world. Now I should be the last person to deny that there has been, during recent geological times, a tendency in that direction in this and other regions. There are certainly indications that the rainfall in the interior of the Sahara, especially the western Sahara, was formerly greater than at present; but is there any satisfactory evidence, which would support the idea that such a change is now taking place with the rapidity which the author would suggest? So far as I am aware there is only one really trustworthy piece of evidence, which points strongly in that direction, the decrease in the area of Lake Chad. The rapid shrinkage that is reported may, however, be only temporary. We may compare it with that of certain glaciers. There may be, there probably is, a slow secular decrease in the glaciers of most parts of the world; but a period of accelerated recession is usually followed by one of advance, and if there has been such a rapid diminution of the rainfall, as the author believes, it will probably give place, for a time at least, to an increase.

I do not think one can trust implicitly variations in vegetation as evidence of climatic desiccation. In many parts of the world the inhabitants set fire to the forest, from time to time, with a view of utilizing for pasture the growth of succulent grass that immediately follows, and after the trees have been burnt down, heavy showers are apt to wash away the surface soil, so that the forest cannot grow again. Trees may also be destroyed by herds of goats or camels, and the onward movement of the desert sand may prove even more inimical to their growth. Accordingly, in some cases at least, forest may give place to barren tracts without any considerable change in the rainfall.

Mr. L. C. W. BONACINA: I thought I might suggest it would be interesting to discover if the presence of large lakes in the tropical parts of Africa could be found to have any distinct influence upon the amount of rainfall. I fancy that local features like lakes in the tropics would be more inclined to have a direct influence on the amount of rainfall than in higher latitudes: in other words, that water rising from tropical lakes would have more chance of coming down again *in situ*, or nearly so. I have nothing to add of any importance to the interesting discussion.

Dr. STRAHAN: It merely remains for me to express the opinion, which I believe will be shared by all, that the paper has been interesting, and has led to an important discussion. There is one point on which I should like further explanation. I do not quite understand the statement that the further you go back in your records, the less the mean will be, although the rainfall has diminished.

Mr. KNOX: It is the longer you continue the period, the further you go forward, the less the mean.

Dr. STRAHAN: That is not made quite clear in the paper as printed. I will now ask Mr. Knox to reply to the points raised in discussion.

Mr. KNOX: In other parts of Africa there is a fair amount of information to go on, and, as I was making a rainfall map of Africa—which I have done—it would not do to include the south and the east and the west coast, and leave this portion blank on the published map. The isohyets had to be drawn, and the question was how to draw them. Of course, we have really very little to go on. With regard to

what Dr. Mill said about the committee of the British Association collecting various details and securing their accuracy, there is an enormous number of mistakes in a publication which was prepared either by this committee or by its president, and issued by the Meteorological Department. It is called 'I. Tropical Africa.' If any one cares to see it, I shall be glad to give them this list of errors.

With regard to Timbuktu, nearly all the French authors agree that, in that region and a little to the east of it, the Sudan is encroaching on the Sahara, and not the Sahara on the Sudan, and, whatever the effect of the sand may be there, the vegetation keeps on increasing.

REVIEWS.

ASIA.

A Dutch Embassy to Persia.

'Journaal der Reis van den Gezant der O. I. Compagnie Joan Cunaeus naar Perzië in 1651–1652, door Cornelius Speelman.' Edited by A. Hotz. Amsterdam: Johannes Müller. 1908.

Mr. A. Hotz, whose excellent edition of Roobacker's journal of a voyage from Gombroon to Basra in 1645 was noticed in the *Journal* for January, 1908, p. 93, has since edited, for the Historical Society of Utrecht, the work of which the title is given above, and has thus added still further to our knowledge of Dutch intercourse with Persia in the seventeenth century. The embassy, whose doings are recorded in this journal, left Batavia on September 15, 1651, and on February 27 reached Ispahan, where it stayed until June 15, returning to Batavia on November 12. The chief value of the journal is that the route therein described, as followed by the embassy from Gombroon to Ispahan and back, was not the usual one by Forg, Darab, Fosa, etc., to Shiraz and thence by Murghab and Sumek to Yezdikhast, but by a more westerly one *viâ* Lar and Jahrum to Shiraz (see the notes of Lieuts. Wilson and Cruickshank in *Geographical Journal* for 1908, pp. 152–169, and map, p. 244), and thence *viâ* Mayin, Shahkuh, etc., to Yezdikhast. Mr. Hotz has not only annotated fully the journal, but has added appendices, bibliography, registers of names and details regarding Dutch officials mentioned, index, etc., and, above all, a most valuable introduction of one hundred pages, in which is given much interesting information regarding Joan Cunaeus, the ambassador, and other members of the embassy, especially Cornelius Speelman, the secretary (and future governor-general of Netherlands India), who not only wrote, but composed the journal, as Mr. Hotz incontestably proves, and Philip Angel, the artist who accompanied the expedition. In connection with these two persons, Mr. Hotz has, by means of this diary, made an interesting discovery, viz., that the description of the ruins of Persepolis, printed by Valentyn in the fifth part of his *Oud en Nieuw Oost-Indien*, pp. 221–224, and there ascribed by him to Herbert de Jager in 1693, is actually taken, with a few alterations, from this journal of Speelman's, while the drawing of the ruins, of which Valentyn gives a large plate, and which he attributes likewise to de Jager, was in reality the work of Philip Angel while accompanying this embassy. Another member of the embassy was Captain John Dutton, an Englishman married to a Dutch wife at Batavia, who subsequently took service under the English East India Company, and gave the Dutch much trouble, as Mr. Hotz relates. There are portraits of Speelman and Cunaeus, views and plans of Persepolis, Ispahan, etc., and a map of Persia, in which are marked the route taken by the embassy and the other more frequented routes between the sea and Shiraz. Altogether this valuable

and scholarly work does the highest credit to Mr. Hotz, and is an important contribution to the history of Persia in the seventeenth century.

DONALD FERGUSON.

THE ROUTE OF THE BAGHDAD RAILWAY.

'The Short Cut to India: the Record of a Journey along the Route of the Baghdad Railway.' By David Fraser. Edinburgh and London: Blackwood. 1909. *Price* 12*s.* 6*d. net.*

Mr. Fraser's bright and picturesque volume is a timely reminder that the long-pending question of improved communication between Europe and the East is in speedy prospect of settlement. The much-talked-of Baghdad railway is for the moment hung up—near the head of the Gulf of Iskanderun—so far as construction is concerned, but guarantees for the prolongation of the line through four more sections have been allocated to the Germans by the Turkish Government; and this fact should serve to convince us that this great undertaking may soon emerge into a region where its bearings and future possibilities will possess a very considerable interest for Great Britain. Whether the future terminus will be Bussorah or Koweit is in itself a question of no small moment. The former is the more important port, and Mr. Fraser is of opinion that probably in the end it will be definitely chosen as the terminus. On the other hand, Koweit would appear to be the ultimate objective point favoured by the Germans, and the reason for this is not difficult to conjecture when we bear in mind that it would also form the terminus of the suggested British railway from Akaba to the head of the Persian gulf, a project which is beginning to attract a good deal of attention. In helping the Government to decide upon a distinct line of policy with reference to these two undertakings, Mr. Fraser's book will supply much useful and recent information. Although he does not touch on the trans-Arabian project, a great many of his comments and arguments apply equally if not with even greater force to that route. For instance, speaking of the acceleration of the Indian mails, the author points out that if once the Baghdad railway were constructed, the reduction of time would amount to three days as between London and Karachi. On the other hand, the saving would be no less than seven days if the Indo-Egyptian railroad were carried out in its entirety. This fact of itself goes to prove that there is more than one "short cut" to India. However, one can but feel grateful that the topic is brought forward at all, no matter what the precise alignment is. The route actually traversed by the author was by rail from the Bosphorus to the rail head at Eregli, and thence by way of Aleppo to Diarbekir, and thence down the Tigris to the Gulf. But while crossing through the northern part of the Mesopotamian country, he was set upon by a robber and seriously wounded. This unfortunate incident led to Fraser being conveyed first to Urfa for treatment at the American Mission, and then back to Aleppo, where he was for seventeen weeks a convalescent in the house of the Rev. W. M. Christie. The author was thus much handicapped in his further journey southwards, but nevertheless he contributes much interesting information regarding the riparian districts, and especially about the project of reorganizing the irrigation works in lower Mesopotamia, an undertaking of vast importance which has been entrusted by the Turkish Government to Sir William Willcocks. As an up-to-date picture of a region now entering into the very forefront of international politics, the work is sure of a large circle of readers.

AFRICA.

Africa Minor.

'L'Afrique du Nord. Tunisie—Algérie—Maroc.' Avec 27 gravures dans le texte et 3 cartes hors texte. Par Henri Lorin. Paris: Librairie Armand Colin. 1908. 3 *fr.*

This is a well-informed, clearly written manual upon Africa Minor, a more accurate designation of the region of which he treats than that chosen by M. Lorin. The essential physical unity of the three countries is one of the commonplaces of the geographer. This is shown by the author (who is well acquainted with Algeria and Tunisia) in his opening chapter. Then follows a chapter of twenty-eight pages — a good piece of work — in which the whole history of the land is summarized, while the preliminary survey is closed by an account of the different races of Africa Minor. The greater part of the book is occupied with regional studies (excellent pen-pictures readily bringing to mind the aspect of the district described), and with accounts of the economic resources of the land. The closing chapters deal with political and racial questions. M. Lorin discusses a subject which has much troubled the French colonial party. Though France be mistress of Algeria and Tunisia, in addition to her "reversionary rights" in Morocco, the majority of their European inhabitants are Spaniards and Italians. The country is not for the Frenchman of pure lineage. But the three races mix freely, and a new type, called by M. Lorin the Neo-Français, is being somewhat rapidly evolved. "Dans l'amalgame qui se fait, le sang français représente le ferment intellectual, le bouquet; le sang des races latines de la Méditerranée apporte au type final une physiologie mieux assouplie aux climats méridionaux, plus de resistance avec moins de finesse." At the other end of the continent, in the evolution of the Afrikander, we are witnessing a similar phenomenon, though one which is much slower in development. To each of his sections the author appends a brief *résumé* of its contents; he gives also useful bibliographical notes (French works only being cited). 'L'Afrique du Nord' altogether forms an admirable introduction to a subject of ever-present interest.

F. R. C.

POLAR REGIONS.

A Royal Adventurer in the Kara Sea.

'La Revanche de la Banquise. Un été de dérive dans la mer de Kara.' By Monseigneur le Duc D'Orléans. Paris: Plon Nourrit et Cie. 1909. *Price* 30 *fr.*; *bound*, 45 *fr.*

This sumptuous volume, with its beautiful illustrations, is equal in artistic and literary merit to the previous one in which the royal author described his successful voyage of 1905 from Spitsbergen to the west coast of Greenland, under the title, 'A travers la Banquise du Spitzberg au Cap Phillipe.' The Duc d'Orléans had not the privilege, in his cruise of 1907 to the Barents and Kara seas, to visit hitherto unknown shores, nor to raise the flag of France on soil previously unvisited by civilized man. The unbounded good fortune which favoured the royal explorer in his previous voyage deserted him in 1907, and a long and weary drift in the pack-ice of the Kara sea is the main feature of the narrative. To felicitously detail the record of a wait of many days in an ice-bound ship, dependent for progression on the winds and currents of the Kara sea, would tax the powers of most writers; but so delightfully facile is the pen of the Duc d'Orléans, so vivid are his descriptions, in which gravity, gaiety, sentiment, and sound sense are so pleasantly intermingled, that there is not a dull passage in the entire letterpress. The *Belgica*, with the Duc d'Orléans and his party, left Vardö on the evening of July 8. The ice conditions in Barents sea were most favourable; the coast of Novaya Zemlya, in the vicinity of Cape Britwin, was sighted on the 12th, and the 13th saw the vessel inside of the

Matyushin Shar. By July 15 this strait had been traversed, the only obstacles met with being two barriers of season ice, which were forced without much difficulty. The outlook from the eastern entrance of the Matyushin Shar was most unpromising; the ice-pack of the Kara sea was pressed up against the eastern shores of Novaya Zemlya and extended as far as the eye could range, from a considerable elevation, to seaward. It was determined, however, to push the *Belgica* into the pack-ice, with the result that on July 16 the vessel was beset in lat. 72° 51′ N., a few miles to the eastward of Cape Shubert. Then commenced the painfully slow drift down the east coast of the south island of Novaya Zemlya. The winds were persistently unfavourable, chiefly from north-north-east to east, pushing the ice-pack against the land, and it was not till August 16 that the *Belgica* drifted abreast the eastern entrance of the Kara strait, in lat. 70° 37′ N., exactly a month from the date of her being beset. The vessel had taken thirty-one days to drift 133 miles, or an average of a little more than 4 miles a day. The drift through the Kara strait was safely accomplished, though the imprisoned *Belgica* was more than once in great peril of being forced on some of the rocks and inlets that stud that dangerous channel. By August 20 the vessel was back in the Barents sea, and a course was set along the west coast of the south island. The chapter of misfortune had not, however, closed. Turning aside to investigate Gribova bay, the *Belgica* ran on to an uncharted rock. After throwing overboard twenty tons of coal and otherwise lightening the ship, she refloated without much damage, but the loss of fuel put a stop to any prospect of a return to the Kara sea. The *Belgica* next proceeded to Pomorsky bay, at the western entrance of the Matyushin Shar, having completed the entire circuit of the south island of Novaya Zemlya. Leaving Pomorsky bay August 29, the voyage was continued along the west coast of the north island in an ice-free sea. The magnificent scenery of this little-known Arctic land is splendidly illustrated in the work under review. The highest latitude attained directly to the north of Novaya Zemlya was 78°, on September 1. The ship's head was then set for Norway, which was reached on September 11. Throughout the voyage scientific observations, dredgings, and soundings were carried out by highly competent observers; large biological collections were obtained. Want of space forbids more than a passing reference to this subject, but the valuable appendices attached give solid value to this attractive volume. H. W. F.

Sir Leopold McClintock.

'Life of Admiral Sir Leopold McClintock.' By Sir Clements Markham. London: Murray. 1909. 15*s. net.*

No one is better qualified to write the life of Sir Leopold McClintock than Sir Clements Markham. He was Sir Leopold's messmate in the "Happy and jolly *Assistance*" in the years 1850–1 in one of the search expeditions, hoping to solve the mystery of the fate of Sir John Franklin and his unfortunate companions; he had also seen a great deal of him at other times. I was also a messmate with McClintock and Markham in the *Assistance*, and almost one with the former in the *Resolute* from 1852–4 in the succeeding search expedition, when he commanded the *Intrepid*, her tender. So I have a right to express my opinion on the admirable manner in which the life has been edited, and on the correctness of every fact narrated in it. Enough naval and military officers and eminent civilians volunteered for service in the Arctic expedition had there been no seamen. Amongst the volunteers was Sir Richard Burton. On looking back on those days, we realize how much McClintock in his quiet way contributed to the harmony that prevailed on board our ship. I cannot recall an instance of any dissension amongst us in our mess-place, and only one in the steerage outside the mess-place amongst our

smokers. McClintock was our mainspring in our mess as much as he was in preparing for our principal work, in exploring the land by sledge travelling over the ice by manual labour, as heavy work as man can be put to.

In 1849, McClintock was second to Sir James Ross in a sledge journey, in which he saw many errors owing to inexperience in the work, such as shortness of food, inadequate equipment, and one fatal error in not bringing tobacco—for Jack dearly loves his pipe. For remedying these defects McClintock's intuitive genius had grand scope. After paying off the *Enterprise* he spent his winter with his family in Dublin, and his practical knowledge, in conjunction with his great friend Prof. Haughton's theoretical and scientific knowledge, developed the best practical cooking apparatus for Arctic purposes that had ever been produced up to that time. The details will be found (pp. 115–116) in the work. The allowance of fuel to cook for seven men daily was only 1 pint and 1 gill of spirit of wine, or 1 lb. 8 ozs. of stearine tallow: so small a quantity could not have sufficed but for the scientific construction of the cooking apparatus, which developed a maximum of heat on a minimum of fuel. The greatest attention was given to reducing the weight of every article to a minimum, as the more the dead weights* were reduced, so much more provision could be carried. The clothing of the men was also as great an object of careful selection, as was the food-supply, which latter was ample, nutritious, and much appreciated by all the sledge crews, and they returned in excellent health, as a rule. Frequent meetings during the spring were held in the commodore's cabin, in which all the leaders of parties were thoroughly instructed in all the duties of a sledge-officer, relative to care of their men, etc. I know some of the other ship's officers, and even a very few of our own, looked on reaching Melville island as quite chimerical; and I well remember our commodore observing during one of our cabin discussions, "Any party that remains out sixty days and travels 600 miles will meet my full approbation," and as not more than 400 had ever been done, I rather fancy 600 was more than he anticipated. Several of the parties just reached the sixty days or a day or two over, and Bradford's sledge and McClintock's were the last in, having been absent just eighty days. Sherard Osborn, in his Arctic journal, observes, "Lieut. McClintock has fairly won the palm." "In eighty days he had travelled 800 miles, and heartily did all congratulate him on his success." In 1852, the *Resolute* and *Assistance* were again commissioned for another attempt to solve the Franklin mystery. I was one of the lieutenants of the *Resolute*, and McClintock was commander of the *Intrepid*, our tender, so we were almost messmates again. Here I can personally testify to his practically being our real leader, Captain Kellett having had no previous Arctic experience, and in the early part of the winter having no great confidence or enthusiasm for sledge-travelling. Fortunately he turned over a new leaf, and became a zealous convert in good time. McClintock and Mecham thoroughly organized the equipment of our branch of the expedition, and accomplished journeys which still bear the record. McClintock was away 105 days, and the sledge had gone over 1177 statute miles, besides examining bays and inlets in the Satellite—a small sledge invented by McClintock for two men to drag—and carried on the larger sledge. I used mine for fifteen days (see p. 162), leaving the sledge encamped under—to use Markham's name for him—that "grand old sailor, George Murray" (p. 169), who, according to his orders, would have started back for the ship the evening we arrived; as the three Satellites had only had a ptarmigan for breakfast, and as Murray had no watch, we were a little anxious, as, although a depôt of provisions was left, finding it in a fog might have caused delay. This experience proved the value of the Satellites.

* Everything but provisions.

For the early days of Arctic exploration (1818–30), those in command were all young men. I cannot too strongly endorse Markham's views (pp. 139–140) as to the necessity of the commanders being comparatively young men—Parry and those under him were mostly under thirty. Common sense pointed to McClintock and Sherard Osborn as the leaders of the two divisions of 1852–4. Belcher was fifty-six and also infirm; Kellett was forty-seven years of age when nominated for the command, and had no experience, remedied, fortunately, by availing himself of McClintock's experience. Belcher had an almost equally good adviser in Sherard Osborn, but was too tyrannical and obstinate to avail himself of his capabilities; we younger men knew that with McClintock and Osborn in chief command the work we did would have been trebled, and we should not have disgracefully abandoned our ships, against which Kellett most strongly remonstrated.

Arctic work requires, more than any other, full possession of the mental and physical powers, and to be able to set an example in both, it requires more than most work, young men in a junior grade with a prospect before them. I don't know which to blame most, Sir John Franklin volunteering for at fifty-nine, or the Admiralty who appointed him. Had I been at the Admiralty, I would have selected a commander or young captain not over forty, and most of those under him from twenty-two or three to thirty years of age, and as a rule I would prefer a commander to a captain. We have just got a brief account of Shackleton's expedition, but enough to satisfy us that only comparative youth could have done the work. A leader sledge-travelling must set the example—men will always follow a competent leader—and that was never better seen than in the little *Fox*. There you will find the captain, when sledging, working as hard as any of his crew, if not harder, Allen Young returning for medical aid, and, against medical advice, starting in four days to resume his interrupted work, and, I am sure, with a crew fired by the example set by their leader. Hobson also was a sufferer, but even then he set an example to his crew.

That long drift in the "pack" down Baffin's bay was enough to demoralize any crew, and I am perfectly sure the *Fox's* must have been, to use a nautical phrase, when they were hardly out of the ice, "taken aback" by the result of their leader's winter cogitations expressed briefly "North'ard ho." For then they realized the truth of Salmon's letter to his old shipmate in previous expeditions (p. 199), "You are in for success this time, for you have got *the* captain that will not come back before he finishes the work he goes out to do;" and they willingly returned northward, and success attended them in clearing up the Franklin mystery, and a proud day it must have been to Lady Franklin when her small venture won the prize; as it was to us, his old friends and companions, to know that it was McClintock "who wouldn't turn back till he had succeeded."

When all the travelling parties had returned, McClintock had a new post. Owing to the death of his engineer and stoker, he had to perform their work, and prepare the engines for sea. The studies in steam and the practical working of the little *Bee*, the students' vessel at Royal Naval College, enabled him to succeed, and I imagine for the first, and probably the last, time was seen the captain in the engine-room working the engines, instead of in the crow's nest navigating his ship through the narrows and risk of a polar pack. To those who want full information I would say, read McClintock's narrative of the *Fox*. I have now just read the end of the *Fox's* narrative; when I see what was done in the *Fox* in geological, botanical, and other scientific work, I cannot but realize how much we youngsters lost through the "ologies" being not only discouraged, but almost forbidden between 1850–55.

R. Vesey Hamilton.

GENERAL.

A Supposed Cause of Glacial Periods.

'The Zonal-Belt Hypothesis: a New Explanation of the Cause of the Ice Ages.' By Joseph T. Wheeler. Philadelphia and London: I. B. Lippincott Co. 1908. *Price* $2.50 *net.*

In this book we have one more speculation as to the cause of Glacial periods. It is supposed by the author that the Earth has been girt with a combination of Saturn-like rings and Jupiter-like belts of impalpable matter, which profoundly affected the climate of the lands lying beneath. These conditions are held to have persisted into times so geologically recent that they were experienced by early man, and have afforded the basis of many of his myths. The statement and interpretation of these myths, and incidentally a new torturing of Genesis under the old plea of "reconciliation," fill the major portion of the book.

Evidently the product of meditation and much reading, the volume, like many of its class, is largely a miscellany of long quotations from all sorts of authors; and it contains verses which are sometimes transparently original. We do not think that it will be regarded as a solution of the problem dealt with. It may, however, interest the reader who can tolerate an ingenious argument imaginatively presented.

G. W. L.

Geographical Pictures.

'Philips' Geographical Pictures.' Edited by P. H. L'Estrange. G. Philip & Son, 32, Fleet Street, London. The set of 20 Plates, 21*s.*; single plates, 1*s.* 3*d.*

It is an encouraging sign of progress in the teaching of geography when publishers venture upon the considerable expense of bringing out a series of plates, illustrating geographical features, with the hopeful expectation of getting their money back and something more by sales to schools. Time was, and not so very long ago, when geography was taught without these helpful illustrations. Now several series of plates are to be had, among which the handsomest are the coloured 'Geographische Characterbilder,' published by Hölzel of Vienna; while the newest series of the kind, consisting of twenty plates, 20 by 14½ inches, reproduced from photographs, has lately been prepared by P. H. L'Estrange, assistant master at Malvern College, and published in black and white by G. Philip & Son, London. The series includes thirteen plates, entitled "Land-forms," with sub-headings, "Sedimentary rocks, volcanic work, ice work, river work," and seven plates entitled "Climate and Vegetation." Many of the plates are of fine pictorial quality, and are well printed, so that they may serve a decorative as well as an instructive purpose in schoolrooms. Each plate has a title: for example, No. 7, Volcanic work, a crater; No. 10, Ice work, a glacier; No. 12, Antarctic views, iceberg; No. 20, Sugar culture. Underneath is a brief text giving the locality of the view, some explanation of its leading features, and a few questions by which pupils will be led to study the more important features of the picture. There can be no doubt that the intelligent use of this series of illustrations in schools will prove enlivening and instructive.

In certain respects one might wish that the text of the plates gave a somewhat different direction to the pupils' attention. For example, under the general heading "Land-forms," an excellent example of cliffed headlands is given from near Flamborough head; but its sub-title is "Sedimentary rocks—flat rocks (worn by the sea)." Sea-cliffs would have been a better name, as calling immediate attention to the most striking land-form that the plate represents; the explanation and the questions would, better than the title, direct attention to the structure on which, and to the agency by which, the form was produced. In No. 9, attention is diverted

almost entirely away from land-form and turned to land-structure by the emphasis given to the occurrence of basalt intersecting and overlying chalk, and by the questions, which are chiefly directed to matters of the geological past rather than to the geographical present. "Sedimentary rocks" does not stand well as a sub-title in the same rank with volcanic work, ice work, and river work; and under "Land-forms—ice work," an excellent picture of a floating iceberg seems out of place. In a few cases, the pictures are not well chosen: in No. 6, Land-forms; sedimentary rocks—folded mountain and glacier," the rocks do not show a "folded mountain," but only one limb of a fold; and only a small part of a "glacier" is visible, from which no good idea of a glacier can be gained. As is often the case in such pictures, erosion has no mention in the title, although it is quite as important an element as folding in determining the mountain form. "No. 3, Land-forms, flat rocks (river-worn)," is an excellent picture of a waterfall, taken from a point where the reach above the fall is not seen; but for purposes of instructing the uninformed, a picture showing the upper reach and the lower reach with the waterfall between them would have been much more helpful. No. 4, an excellent picture of Church Rock, near Clovelly, gives too much importance to a small and exceptional rock-form, and might be replaced to advantage by a more general view. As a whole, the pictures themselves are better than the plan of selection or the accompanying text.

W. M. D.

SHORT NOTICES.

Europe.—'The Origin of Kingston-upon-Hull.' By J. Travis-Cook. (London: Brown & Sons. 1909. Pp. x., 68. *Map.* 2*s.*) This is one of those volumes which find their chief attraction in the obvious enthusiasm of the author for his subject, and the care which he has bestowed on its elucidation. The story of the origin of this great port, which in unofficial usage has curiously taken the name of the river on which it lies, is full of interest.

'Galicia, the Switzerland of Spain.' By Annette M. B. Meakin. (London: Methuen. 1909. Pp. xi., 375. *Map and Illustrations.* 12*s.* 6*d.*) We are safe in expecting a valuable volume from Miss Meakin on any country she visits, and in the present case she has even exceeded expectation. Her works are not merely the result of observation alone, but of genuine study combined with observation; and in matters relating to the history and archæology, no less than to the scenic and human picturesqueness of this north-western corner of Spain, her volume will form a most valuable guide. All the photographs are good; many exceptionally so.

'Through Bosnia and Herzegovina with a Paint Brush.' By Mrs. E. R. Whitwell. (London: Simpkin Marshall. 1909. Pp. 76. *Illustrations.*) The text of this volume can only be described as "slight." The coloured reproductions of paintings are of somewhat unequal merit, but some are charming, particularly the scenes in towns: in landscape the artist is far less successful.

'Madeira Old and New.' By W. H. Koebel. (London: Francis Griffiths. 1909. Pp. xvi., 216. *Maps and Illustrations.* 10*s.* 6*d.*) The "old" section of this book contains a number of historical sketches, mostly of a picturesque and strictly local character. They afford a clear conception of the island in early times. This section as a whole is superior to the "new," in which a good part of the matter is not of much greater interest than that in the guide-books, though it reveals an intimate knowledge of the island. Of the many photographs, those are most noteworthy which reproduce atmospheric effects; many have suffered from indifferent reproduction.

Asia.—'Travels in the Island of Cyprus.' Translated from the Italian of Giovanni Mariti by C. D. Cobham, C.M.G. (Cambridge: University Press. 1909.

Pp. vii., 199. 4*s*.) This second edition has received important alterations. The original is a careful and valuable account of Cyprus in the middle of the eighteenth century. The island is fortunate in the possession of so earnest a student as Mr. Cobham, whose work affords promise of the realization of his wish that "as many as possible of the original sources of Cypriot history" should be made accessible in English.

'European Travellers in India.' By E. F. Oaten. (London: Kegan Paul. 1909. Pp. xiv., 274.) The author writes in his preface, "The subject for the Le Bas Prize Essay of 1908 was as follows: 'European travellers in India during the fifteenth, sixteenth, and seventeenth centuries; the evidence afforded by them with respect to Indian social institutions; and the nature and influence of Indian Governments.'" It is obviously most valuable to have a survey of this sort accessible in a small compass, and the author has excellently classified and arranged it. A comprehensive bibliography is given, and when it is stated that the index of travellers includes upwards of one hundred and twenty names, the completeness of the work will be appreciated.

America.—'A Canyon Voyage.' By Frederick S. Dellenbaugh. (New York and London: Putnam's Sons. 1908. Pp. xx., 277. *Maps and Illustrations.* $3.50.) This is the first full narrative, and a most fascinating one, of an expedition made nearly forty years ago—"the narrative of the second Powell expedition down the Green-Colorado river from Wyoming, and the explorations on land, in the years 1871 and 1872." It affords always entertaining and at times most exciting reading; moreover, not a little is to be gleaned from it on the physical, climatic, ethnological, and antiquarian characteristics of the country, while as a purely topographical study it is excellent. The author was artist and assistant topographer of the expedition, and some of his sketches and a large number of photographs are given.

'Les Grandes Antilles.' By Daniel Bellet. (Paris: Guilmoto. 1909. Pp. xii., 315. *Map.* 6 *fr.*) This is a useful general work of a type more common in France and Germany than in England. The author deals successively with Cuba, Porto Rico, Haiti, Santo Domingo, and Jamaica, and for each of these islands or territories his arrangement of matter is broadly similar—topography, political conditions, population, administration, communications, economic conditions, mutual resources, and industries being treated. M. E. Levasseur contributes a preface which embodies a brief historical retrospect.

General.—'Stanford's Compendium of Geography and Travel.' 'Asia,' vol. ii. By A. H. Keane. (1909.) 'Australasia,' vol. ii. By F. H. H. Guillemard, revised by A. H. Keane. (1908.) (London: Stanford. Pp. xxvi., 526; xvi., 574. *Maps and Illustrations.* 15*s*. each volume.) These two volumes of this well-known series bear evidence that the difficult process of revision has been carefully applied. It is often harder to check existing statements than to compile new ones, but few of doubtful accuracy can have escaped the reviser. Some of the commercial and similar statistics are given somewhat baldly, and do not convey much impression to the mind, but as a whole the standard of the arrangement of matter in the volumes is very high.

'The Life of Philibert Commerson.' By Captain S. Pasfield Oliver. Edited by G. F. Scott Elliot. (London: Murray. 1909. Pp. xvii., 242. *Illustrations.* 10*s*. 6*d*.) This biography of the great French botanist and traveller of the eighteenth century was compiled and in great part set in order by Captain Pasfield Oliver, a Fellow of the Society, whose death occurred in 1907. When he felt unable to complete his book he delegated it to Mr. Scott Elliot, who, however, in a preface disclaims any important share in the work. Commerson's story is full of interest; the picture of conditions of travel in his day will most attract the geographer, but

from the biographical standpoint praise should be given to the clear delineation of a remarkable character.

'George Brown, D.D., Pioneer Missionary and Explorer. An Autobiography.' (London: Hodder & Stoughton. 1908. Pp. xii, 536. *Map and Illustrations.* 15s.) Great parts of this voluminous work will have their chief interest for Dr. Brown's own followers, who may have personal knowledge of his many fellow-workers. He travelled and worked for forty-eight years in Samoa, New Guinea, the Solomon islands, and the great group of islands to the north. In this time he broke not a little ground new to white men, but it is rather through his study of the natives than through that of their countries that his book will be found of value, and the bulk of the photographs illustrate the ethnological side of the book. It need hardly be said that this is a fine record of devotion to a life's work.

THE MONTHLY RECORD.

EUROPE.

The Temperature of Loch Garry, Inverness-shire.—Temperature observations in this lake were made in 1908 by Mr. E. M. Wedderburn, who has contributed a paper dealing with the results to the *Proceedings of the Royal Society of Edinburgh*, vol. **29**, part ii. No. 8. The main object of the author was to discover whether the temperature behaviour of Loch Garry was similar to that of Loch Ness, as it was doubted whether the presence of a temperature seiche, which had been fully established in the latter lake, could occur in a lake of such moderate length and depth as Loch Garry. Owing to the failure to act of a Callendar recorder which had been used to obtain a continuous record of temperature in the case of Loch Ness, the observations were taken with mercury thermometers on every day when weather and other circumstances permitted. Most of the observations were made from a boat attached to a buoy moored over the deepest part of the lake, but by means of a light anchor the boat could be readily anchored in any part of the loch. The period covered by the observations mainly embraced the six months February to July. Periodical observations of the temperature of the upper river Garry—the longest stream entering the lake—were also made, since the temperature of water in a shallow in-flowing stream, being readily affected by changes of atmospheric temperature and by sunshine, is a useful guide to the quantity of heat which the lake is receiving. The quantity of heat stored up in the lake for successive weeks during the period of observation was approximately estimated by calculating roughly from the contour of the lake-basin the quantity of water between the surface and a depth of 10 feet, between the depths of 10 and 25 feet, 25 and 50 feet, and so on, and by taking temperature readings at the surface, 10, 25, 50 feet, etc., below it. The calculation was made on the assumption that the observations having been taken about the *centre* of the lake were typical of the whole lake. Although the area of Loch Ness is only twelve times that of Loch Garry, the calculated quantity of heat stored up during the spring and summer months is twenty times as great. This is due partly to the fact that there is a greater outflow of warm surface water from Loch Garry than from Loch Ness, and partly to the smaller area of the former lake, which allows the surface water to rise more rapidly in temperature than in the case of Loch Ness, whereby the date at which the lake ceases to gain in temperature by conduction is earlier. After rapid gain of heat till the middle of June, 1908, a sudden spell of cold weather at that time caused an actual loss of heat in Loch Garry, and when the daily temperature observations at different levels for the month were compared,

it was discovered that a layer of temperature discontinuity appeared between the depths of 50 and 75 feet, which confirmed the author's previously expressed opinion that a discontinuity always appears when the gain of heat ceases. On July 10 and 11, and again from the 23rd to 25th, hourly observations by day and night were made at one end of the loch, and the results showed the progress of a temperature oscillation with a period of about twelve hours. No oscillations were observed at the centre of the lake, which would be the node of a temperature seiche. By cycling rapidly from one end of the lake to the other—a distance of 4 miles—and making observations alternately at the two ends, rough opposition in phase was apparent. The temperature seiche, therefore, is not a phenomenon peculiar to Loch Ness or to very deep lakes. On windy days the bottom and top temperatures of the lake were uniform, or nearly so, but on calm days differences of several degrees often occurred, and this is adduced as evidence that the currents produced by wind are appreciable at the bottom of the lake—200 feet below the surface. Mr. Wedderburn has also studied the peculiarities of Loch Garry in regard to freezing (cf. February number, p. 219).

The Configuration of the Baltic Coast of Germany is the subject of the first of the *Geographische Arbeiten* edited by Dr. Willi Ule, Professor of Geography in the University of Rostock. The author, Dr. Bartels, first discusses the result of investigations made by him, on foot and by sea, under the main headings of horizontal conformation and vertical arrangement, afterwards considering the causes of the facts observed as traceable from Quaternary times. The wide, almost semicircular bays furnish a variety of coastal types. Their horizontal formation is shown to be due to the same causes as is their vertical structure. Each is the result of some natural force, whether tectonic or glacial, or due to denudation. Complex shore types occur in the "boddens," the "haffs," and many of the island coast-lines in the sounds; while simple types are found in the creeks, the semicircular bays, and the smooth coasts. The boddens, such as the Saale Bodden, are due partly to structural block-formations; but also to the embankments of glacial ground-moraines, to the erosion of the sea, or to the accumulation of sand or mud by coastal currents. The haffs of the type of the Frische and Kurishe Haff are deltaic in formation, being mostly due to the activity of rivers whose burden of sediment is cast forth into a deep bay—due to the sinking of a glaciated plateau—and then built up as an embankment by the currents of the sea. The creeks, which are always at right angles to the coast-line, were the outflow channels of the melting glacial water. They are steep-sided troughs, and form deep, safe harbours on the coast of Schleswig-Holstein in the inlets of Kiel and Flensburg. The wide semicircular bays of Neustädt and Pommern were formed in the inter-glacial Earth movements, and continuously worn down by ice-erosion and melting water. The shore-lines are alternately steep and low-lying. The work of the sea and winds has built up and transferred the shifting dunes which characterize this region. Where the edge of the plateau system comes to the sea-coast, the shore-line is that typical of the Glatte Küste, *i.e.* it stretches in a smooth, almost straight line, with imperceptible curves sinking here and there into low-lying dunes. This coincides with the warping of the underlying strata or original ground-moraines on which the plateau rests. The best example of such a coast-line occurs along the eastern part of Pomerania. At the end of the pamphlet there is a clear tabular *résumé* of the data under discussion, which admirably illustrates the horizontal and vertical arrangement of the various coastal types, with the part played in their origin by tectonic, glacial, and erosive forces.

Calabria and its Earthquakes.—The southernmost province of the Italian peninsula, described by Ruskin as beautiful only in a superficial sense, forms the

subject-matter of an interesting paper by M. Maurice Crignoux, of the University of Lyons, in the *Annales de Géographie* for March 15, 1909 (No. 98). The paper discusses the geological structure of Calabria, and the relation of this to geographical features. The liability of the province to destructive earthquakes has been found to depend upon the existence of faults between the Pliocene deposits and the ancient crystalline masses forming the framework of Calabria south of the valley of the Crati. It unfortunately happens that, for natural reasons, the unstable lines of fault marking the limit of the Pliocene and crystalline rocks have been eminently favourable to the growth of villages. Hence the appalling magnitude of the disasters which so invariably ensue upon Calabrian earthquakes. The two borders of the valley of the Crati and of the Mesima, the farther end of the Gulf of Gioia, and the eastern slopes of the Aspromonte contain nearly all the villages which, for the above-mentioned reasons, have always been most ravaged. Calabria may be regarded as an ancient folded mass more or less encroached upon by Secondary and Lower Tertiary marine deposits. North of the valley of the Crati, the rugged limestone mountains characteristic of the Apennine chain through Italy end abruptly, and give place, as aforesaid, to ancient crystalline rocks which continue the mountain range through the greater length of Calabria and into Sicily, broken by the big depression of the Straits of Messina. The high mountain regions, covered with snow in the winter months and shrouded in mists, have a northern vegetation—superb forests of chestnut, beech, pine, and fir; but the depressions of the Mesima and Crati rivers, of the isthmus of Catanzaro occupied by Pliocene deposits, and of course the coast-lines, are entirely Mediterranean in climate and vegetation. The isthmus of Catanzaro divides Calabria naturally into a northern and southern portion.

Climate of Pelagosa Island in the Adriatic.—The following particulars are drawn from a report made by Prof. Julius Hann to the Vienna *Akademie der Wissenschaften* at a meeting of June 11, 1908. In 1894, a meteorological station was erected by Prof. Hann on the island of Pelagosa, between Mount Gargano and the southern Dalmatian islands, a station standing as isolated as a ship anchored in the middle of the Adriatic. Its barometer is fixed at a height, not of 302 feet as formerly given, but of 315 feet. The average atmospheric pressure in the open sea has been determined by Hann as 760·3 millimetres, 1 millimetre lower than on the shores of the Adriatic, *e.g.* at the island of Lesina. There is, therefore, a relatively steep gradient from the coasts to the middle of the sea, accentuated, on the whole, in a belt of low atmospheric pressure following the longitudinal axis of the Adriatic. The daily course of the atmospheric pressure is such as would arise did a current of air at a high elevation flow by night across the sea landwards, but by day at a high elevation from the land seawards. The temperature of this purely pelagic station is compared by Hann with that of Luk-chun in Chinese Turkestan, for which two years' meteorological observations have been worked out by General von Tillo. The Luk-chun station lies in the same latitude with Pelagosa, in a depression in the midst of the Earth's highest plateaus. The sea-station has an average yearly temperature more than 5°·4 Fahr. (3° C.) higher than the extreme continental one. In July the sea-station is quite 15°·12 Fahr. colder, but in January fully 36° Fahr. warmer. Again, the yearly oscillation of temperature at Luk-chun is nearly three times as great as that at Pelagosa—77°·4 Fahr. as against 26°·64 Fahr. The mean minimum at Pelagosa falls 5°·4 Fahr. short of that on the Dalmatian coast opposite Lesina; the mean maximum 4°·6 Fahr. short. One of the most intense cold spells from the north was that of the end of January, 1907, when at Trieste the thermometer sank to 9° Fahr., and for twenty-seven hours continued below 10° Fahr. The moderating influence of the sea is attested by the fact that at this time the temperature at Pelagosa did not sink below freezing-point,

although at the beginning the cold-bringing bora (a north-east wind) penetrated to the island. Hann regrets the want of observations on the Italian coast of the Adriatic. Were such available, they might, together with those at Pelagosa, be utilized for drawing up synoptic maps showing notable conditions of the weather of the Adriatic. Of a thoroughly oceanic type is the frequently very low temperature of March and April, and the high temperature of September, higher than that of June, while, again, October is warmer than May. Remarkably uniform is the mean temperature of August, showing an average maximum of 75°·74 Fahr., and an average minimum of 73°·94 Fahr. In the fourteen years' period of observation the coldest month was the January of 1905, with a mean of 44° Fahr.; the hottest, the well-known hot July of 1904, with 77°·7 Fahr. An interesting comparison is again instituted, in respect of humidity, with the interior Asiatic station. In the middle of the Adriatic, opposite Lesina, the average humidity is 8 per cent. greater than at Luk-chun. At Pelagosa, the spring, with 78 per cent. relative humidity, is the moistest season; the summer, with 74 per cent., the least moist. In Luk-chun the order is reversed, though here the humidity amounts in general to but 20 per cent. The atmospheric humidity over the sea, as contrasted with that over the continent, is not so great as one would expect, and this relation between sea and continental humidity has been shown by Gerhard Schott of Hamburg to hold good even on the open oceans. Lastly, the relative amounts of precipitation on sea and land are particularly notable. As far as the rain measurements on Pelagosa admit of comparison with those on the littoral island of Lesina, it appears that the centre of the Adriatic receives little more than half the amount of rain falling on the coast. On the open sea, it is true, conditions producing rainfall occur much more rarely than on a mountainous coast. At Pelagosa, December is still free from snow, yet in the course of ten years March had a yearly average of two snowy days—a feature characteristically maritime. In consequence of its situation in the midst of the belt of low atmospheric pressure along the longitudinal axis of the Adriatic, by far the most prevalent winds are the south-east and north-west.

ASIA.

M. Madrolle's Researches in Hainan.—The report of a lecture on the island of Hainan, delivered by M. Madrolle before the Comité de l'Asie Française in March last, is printed in the *Bulletin* of that body for the same month. The journeys described, which have already been briefly referred to in the *Journal*, were made in 1907, the first taking the traveller through the north-eastern portion of the island, while the second led him through the little-known mountainous interior. In the former direction he reached the foot of Mount Dong-ko, at the eastern extremity of the island, which is regarded by the natives as a sacred spot. It is a granite mass rising to a height of 1100 feet above the sea. On the return to Hai-kao, on the north coast (the one port in the island open to foreign commerce), M. Madrolle visited an interesting volcanic region, which he names the "Chaine des Puys," from the volcanic craters (*Dzong*) by which it is characterized. The principal is the Dzong-tea, which is particularly well preserved, and has an orifice about 250 yards in circumference, with a depth of some 130 feet. To reach the centre of the island, the traveller first crossed the same volcanic zone, afterwards traversing a more open country brought under Chinese influence. The last Chinese market is at Lea-mwi ("Entrance to the mountains"), where the aborigines of the centre, known as Sai (or sometimes as Loi), are first met with. Making his way by steep and narrow paths towards the Ngo-tsi-lea ("Five fingers"), the highest mountain group in the island (exceeding 6500 feet), M. Madrolle crossed several passes and entered the upper basin of the Nai-tsiu, which enters the sea in the

south. Then, turning north, he crossed the Lai-mae-lea range and reached the north coast by a route considerably west of that followed on the outward journey. The mountaineers were at first shy, but he succeeded in opening a friendly intercourse with them, and collected valuable information about them. At the close of the paper he sums up the results of his observations as regards both the physical geography and ethnology. The central backbone of the island is composed of primitive rocks, overlain by sandstones and schists, and the numerous torrents which descend from it form the sources of the chief rivers of the island. The most typical formations are an ancient granite and a series of basaltic rocks, the latter covering the whole northern part of the island, while the north-west seems composed of Palæozoic sedimentary rocks. The volcanic phenomena find their counterpart over a wide area adjoining the Hainan strait. Ethnically, the inhabitants seem to have formerly consisted of two very distinct groups, at present represented by the ultra-brachycephalic people of the East,* who have lost their primitive nationality, and the mesaticephalic peoples of the centre and west, of whom the Sai are the descendants. The influx of peoples from the continent has resulted in the formation of three social groups, who have established themselves in the outer zone of the island, especially in the north, at the expense of the Sai.

The Riabushinsky Expedition to Kamchatka.—At the suggestion and with the financial support of a Moscow banker, Mr. Theodor Riabushinsky, the Imperial Russian Geographical Society lately organized a great expedition for the thorough and comprehensive exploration of Kamchatka from a geographical point of view. For this expedition, in which twenty expert observers are taking part, and which is planned to last two years, Mr. Riabushinsky has set apart the sum of 200,000 roubles, or somewhat more than £21,000. The expedition has been divided into five sections, as follows: (1) The geological section, under the leadership of Messrs. Krug and Konradi. This has as its chief task the investigation of the eastern border of the Kamchatka peninsula, and in particular of its quite unexplored central district. (2) The botanical section, headed by Mr. Komaroff. This has already carried out the task allotted to it (likewise concerned with the eastern part of the peninsula), having made important collections of plants, while the valley of the Kamchatka river has been investigated from the point of view of its agricultural resources, and experiments in cultivation have been carried out. The lakes brought to light have also been scientifically explored, and a thorough investigation has been made of the morainic deposits in the region of Mount Koriatskaya. (3) The zoological section, under the direction of Mr. Schmidt, undertook the study of the fish-fauna of the Kamchatka river, on which three stations have been established for the investigation of the life-history of the species of *Salmo*. The researches of this section at the mouth of the river and in the neighbouring lake of Nerpichye (28 miles long, 10 to 12 miles broad, and about 40 feet deep) have already been completed. The lake seems to represent an ancient arm of the sea, now cut off by a sand-spit, into which arm the Kamchatka river probably once emptied itself. (4) The meteorological section has established three stations, at Tigil, at Kluchevskoye on the Kamchatka river, and at Petropaulovsk, and at these regular observations have since been carried out. (5) The ethnographic section, under Mr. Waldemar Jochelson,† who is accompanied by Mrs. Jochelson and another assistant, is extending its field of action so as to include the Aleutian and

* In spite of the large extent to which the people in the north-east have adopted Chinese language and culture, M. Madrolle found that they retain the primitive form of skull, without modification.

† Mr. Jochelson is well known as having taken part in the Jesup North Pacific Expedition.

Kurile islands, as well as Kamchatka. From a statement by Mr. Jochelson, printed in *Science* for February 19 last, it appears that the work will be so planned as to form an extension of that carried on by the Jesup expedition, which did not succeed in studying the interesting Aleut tribe. The language, habits, and customs and former social relations of this tribe will be investigated, while both here and in Kamchatka an attempt will be made to throw light on the past life of the inhabitants by means of excavation. The investigations in the Kuriles will be specially devoted to the question of the former relations of the Kamchadal to the Ainu.

The Tolmachof Expedition to Northern Siberia.—An important step towards the improvement of our knowledge of the Northern Siberian coast, from the Kolyma to Bering strait, has been taken in the organization of an expedition under Mr. J. P. Tolmachof, keeper of the Geological Museum of the Imperial Academy of Science at St. Petersburg. It has the support of the Ministry of Trade and Industries, as it is hoped that its labours may lead eventually to the opening up of ocean navigation between the Pacific and the northern coast of Siberia. Its principal task will be the study of the physical features of the Arctic coast, from Nijni Kolymsk to the Bering sea. At the same time a party under Mr. Sedof, of the Ministry of Marine, will undertake the survey of the delta of the Kolyma and the necessary hydrological observations. The expedition set out from St. Petersburg on March 1 of this year.

AFRICA.

The Region of Gao on the Middle Niger.—In the first number of *L'Afrique Française* for the present year there appears a vivid description by M. Félix Dubois (whose journey across the Sahara two years ago was recorded at the time in the *Journal*) on the region of Gao, on the left bank of the Middle Niger, the cradle of the ancient Songhai empire. The writer, who navigated this part of the Niger at the time when the full effect of the rains at its sources was shown in the filling of all the channels and backwaters, gives a striking picture of the activity which prevails at the time of the rice-harvest. The region is eminently fitted for the cultivation of rice, that grown there being fully equal in quality to the product of Southern Asia. Before the French occupation much of the land had gone out of cultivation owing to the fear of Tuareg raids, but now that these have been put down with a firm hand, the country is rapidly regaining its former prosperity. M. Dubois strongly urges that the French posts in the Northern Sahara should be provisioned from this region,* and thinks that a regular service of caravans could be instituted with the aid of the Tuareg, Insalah being no less accessible from Gao than it is from Gabes on the Mediterranean, while the time of the rice-harvest (December to January) is just that at which the crossing of the desert can best be effected. The establishment of such a traffic would be an important step towards the unification of the French African empire.

Archæological and Ethnological Investigations in the Western Sudan.—Reports have recently been published of two expeditions, a French and a German, which have been engaged in researches into the archæology and ethnology of the western Sudan. The French expedition, under Lieut. Desplagnes (whose important work, 'Le plateau central Nigérien,' was reviewed in the *Journal* for November, 1907, p. 550), started from Konakri in November, 1906, and made its way through Futa Jallon, the gold-yielding provinces of Sigiri, Bure, and Manding, and other Sudanese districts, to the Black Volta and the hinterland of the Ivory Coast. The leader afterwards joined Dr. Bouet and traversed the districts of Gurumsi, Mossi, and Gurma, returning to the coast through Dahome. Lieut. Desplagnes has lately described the results of his expedition in a lecture before the Paris Geographical

* While rice costs 500 francs the ton at Insalah, it can be produced at Gao for 50.

Society (*La Géographie*, March, 1909, p. 250). He speaks of some of the country traversed, especially in the basin of the upper Niger and in upper Dahome, as surprisingly rich in game. In the gold-yielding districts some interesting archæological observations were made, it being possible to trace the remains left by the various peoples who have exploited the gold-bearing strata in the course of ages. At the present day, the natives are said to encourage the precipitation of the gold by throwing into the pits all the bones they can find, the required result being due to chemical action. In Gurumsi the traveller stayed some weeks, and collected much information of the primitive tribes of that region. The organization of the German expedition, under Dr. L. Frobenius, has already been referred to in the *Journal*. Two reports of progress have been made in the *Zeitschrift* of the Berlin Geographical Society (1908, p. 427; 1909, p. 122). Dr. Frobenius seems to have followed a somewhat similar route to Lieut. Desplagnes. From Dakar he went to Bamako on the Niger, making a trip southward into Liberian territory and afterwards pushing on to Timbuktu, whence he proceeded to Wagadugu, within the bend of the Niger, and thence to Togo. Besides making a general study of the physical features and cultural relations of the region traversed, he has paid special attention to the Habe of the Hombori mountains, the account of which people by Desplagnes contains, he says, serious errors.

The Duke of the Abruzzi's book on Ruwenzori: Errata.—We are asked to call attention to the following corrections which should be made in the English edition of the Duke of the Abruzzi's book, of which a review appeared in the January number of the *Journal*: Page 354, lines 8 to 11 after table, for "on the right circle," "on the left circle," read "vertical circle right," "vertical circle left." Page 356, first column, first line, for "157° 37′" read "135° 37′"; second column, line 21, for "40° 50′·5" read "41° 51′·5"; line 31, for "Moebius" read "Moebius (E.)." Map facing page 355, for "Moebius Pk." read "(E.) Moebius Pk.," and add the letters B and A at the left and right hand ends, respectively, of the strong line indicating the base. A straight line should also be drawn from Point B to that representing the Freshfield pass.

AUSTRALASIA AND PACIFIC ISLANDS.

Terrace Development in New Zealand River-valleys.—In a paper entitled "Some Aspects of the Terrace-development in the Valleys of the Canterbury Rivers," published in the *Transactions and Proceedings of the New Zealand Institute*, 1907 (vol. **40**), Mr. R. Speight gives some account of the mode of formation of the terraces in the main river-valleys, and discusses the agents which have probably led to it. The rivers of Canterbury with which the paper deals—the Waimakariri, Rakaia, Ashburton, and Rangitata—all rise in or near the main range of the Southern Alps, flow south-eastward till they reach the sea, and resemble one another as regards the conditions in which their valleys were formed. The first half of their course is through the mountainous region of Western Canterbury, the second across the plains bordering this region on the south-east. The rocks of the first portion consist chiefly of folded slates, sandstones, and greywackes of Lower Mesozoic age. Relative to their terrace-development, the course of the valleys of the large rivers may be divided into four parts: (1) the *torrent* path, where terraces are not generally found; (2) a wider valley path where *glacier* terraces or shelves are common, but *river* terraces absent; (3) a *gorge* path, where the terraces attain their highest development; (4) a *plain* path, from the foot of the mountains to the sea, where the terraces, though still strongly developed, are simple and continuous in character. In order that a river may form terraces on a large scale, it must possess great power of corrosion, and this power is affected by (1) its gradient; (2) its

volume; (3) its load. With respect to these three properties, the author seeks to account for the fact that terraces are *now* formed on a tremendous scale. The present-day rivers are smaller in volume than they were formerly (geologically speaking), a circumstance which would tend to diminish terrace-formation, and they also run on a gentler gradient now than formerly. One is forced to conclude that the rivers are enabled to terrace to so great an extent the plains on account of their relatively small *load*. If the load of a river is excessive, there will be no energy available for lowering its bed, and hence for forming permanent terraces. There is evidence that the supply of waste due to weathering has diminished in recent times, and that consequently the rivers bear a smaller load. In the Canterbury mountains the supply of *débris* due to frost erosion is still, however, great, and whole mountain-sides are covered with angular *débris* which is continually moving downward. The jointed and folded character of the rocks, together with the absence of plant-covering over large areas, has been favourable to the erosive action of frost.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Submarine Eruptions in the Mediterranean.—Whilst submarine volcanic eruptions doubtless occur from time to time, it is rarely, for obvious reasons, that they come within range of scientific observation, and on that account one welcomes an article upon such phenomena by Mr. H. S. Washington, in the *American Journal of Science* for February, 1909. Two great eruptions—those of Graham island in 1831, and of "Foerstner volcano" near Pantelleria in 1891—were noted and described by competent observers, and these form the subject-matter of Mr. Washington's paper. The disturbances both occurred in that portion of the Mediterranean between Sicily and Tunis which is noteworthy for submarine eruptions, and in comparatively deep water along a fault produced by the separation of the limestone shelves which fringe the coasts of Sicily and Tunis and support the islands of Malta, Gozo, Lampedusa, and Lampione. In 1831, after various premonitory symptoms in the shape of earthquake shocks in Sicily, shocks felt on vessels out at sea, and fetid odours—presumably of sulphuretted hydrogen—a volcanic crater appeared 30 miles from Sciacca off the Sicilian coast, amid great sea disturbances, land rumblings, and clouds of black smoke. This erupted volcanic island was called Graham island by Captain Senhouse, who appropriated it for the British Crown on August 2, 1831. By the end of the year volcanic activity on the spot had wholly ceased, and Graham island disappeared beneath the sea, leaving only a small but dangerous shoal. After diverse premonitory symptoms during 1890, another great disturbance in 1891 resulted in the emergence of a new volcano out of the sea close to the island of Pantelleria, about 33 miles south-west of the site of Graham island, which is called by Mr. Washington "Foerstner volcano." This eruption was remarkable for the ejection of vast numbers of very hot, explosive, roughly spherical "bombs," which discharged steam together with sulphuretted hydrogen and sulphur dioxide. The so-called "pillow" lavas, about the precise mode of origin of which speculation is rife, consist of aggregates of such bomb-like forms. Some of the materials, including lavas and bombs ejected during both eruptions, have been preserved and studied, and submitted to a full chemical analysis by Mr. Washington and others. An interesting fact revealed by the chemical analyses of these *sub-aqueously* ejected scoriaceous lavas is this: that they contain more *ferrous* iron—a higher ratio of FeOS to Fe_2O_3—than *sub-aërially* ejected lavas. It would appear that in the submarine lavas of Graham island and Pantelleria the bulk of the iron present as silicates was kept in a reduced state by the de-oxidizing action, in the absence of atmospheric air, of a mixture of carbon monoxide and hydrogen produced at a high temperature by the interaction of carbon dioxide and steam, both of which were known to be ejected in large quantity in the Graham island outburst;

whereas had the eruption taken place on dry land, a larger proportion of ferrous iron would have been converted into the ferric state by the oxidizing action of atmospheric oxygen and steam. As sulphuretted hydrogen and sulphur dioxide gases were also emitted, it may be supposed that the reducing action was still further intensified. The discharge into the atmosphere by volcanic agency of various gases, normally only present in very small quantity, is not without interest from meteorological and other points of view.

Earthquake Studies in Japan.—The *Bulletin* of the Imperial Earthquake Investigation Committee (Vol. 2, No. 2) contains a number of papers by Dr. F. Omori of Tokyo, dealing with diverse aspects of earthquake-study. One of these papers discusses the occurrence of fore-shocks. Large earthquakes, whose foci have a considerable extension and may be regarded as being equivalent to a collection of a great number of local centres of disturbance arrayed along a zone, seem to be on many occasions preceded by minor shocks. These fore-shocks may occur several hours or days before the great disturbance. The earthquake of Kagi (Formosa) in 1906 affords an example of fore-shocks. This destructive earthquake, which occurred on March 17, 1906, and was caused by the formation of Baishiko and Chinsekiryo faults, was preceded, by about five minutes, by two severe shocks, accompanied by sounds resembling continuous gun-discharges called *yinari*. Dr. Omori considers that large destructive earthquakes could in general be foretold in the epi-central region by these fore-shocks. Hence the tromometrical observations which are carried on in earthquake countries derive practical importance. Another paper deals with the secondary causes of earthquakes. The primary causes of earthquakes are stresses going on in the Earth's crust for a considerable interval of time; but when an earthquake is about to happen, the Earth's crust in the vicinity of its focus is in a critical condition, and must be very sensitive to external agencies like changes in atmospheric pressure, to the amount of precipitation, to tidal movements, etc., which may thus act as secondary causes. There is a close parallelism, not considered by Dr. Omori to be accidental, between the curves showing the variation of the annual number of earthquakes at Tokyo during the period 1876–1907, and the variation of the annual amount of precipitation at Okita and Niigata during the same time. Thus the earthquake frequency at Tokyo on the east side is related to the precipitation amount on the north-west side of the main island of Japan. Secondary cases no doubt determine the moment when a long-continued underground stress will result in a sudden disturbance, and the study of them, together with that of fore-shocks and the investigation of earthquake zones, should be useful for forecasting purposes.

Longitude of Ascension and of the Cape.—Last year a careful redetermination of the difference in longitude between Greenwich and Ascension on the one hand, and between Ascension and the Cape on the other, was made under the auspices of the Hydrographical Office, the general direction of the operations being placed in the hands of Sir W. H. M. Christie, Astronomer Royal. The occasion for the execution of the work was supplied by the visit of H.M.S. *Mutine* to Ascension in the early part of 1908, and the observations at the island were entrusted to Captain Monro and Lieut. Gibson of that ship, who attended at the Royal Observatory, Greenwich, both before and after the visit, for the purpose of ascertaining their personal equation. At the Cape the observations were undertaken by Mr. Pett, of the Cape Observatory, while Captain C. H. Simpson, R.N., superintended the signaling operations at Greenwich. The use of the cable was kindly placed at the disposal of the observers by the Eastern Telegraph Company, and by suitably joining up the separate sections intermediate relays were avoided, signals being satisfactorily received through lengths of 4213 and 2687 nautical miles respectively.

A detailed account of the operations appeared in the *Monthly Notices* of the Royal Astronomical Society, vol. **69**, No. 1, but it may suffice here to record the preliminary results, which are as follows (the mean of the observers at Ascension being adopted):—

	h. m. s.		s.
Greenwich—Ascension ...	... 0 57 40·37	...	±0·025
Cape—Ascension ...	... 2 11 34·99	...	±0·008
Greenwich—Cape ...	... 1 13 54·62	...	±0·022

The longitude of the Cape hitherto adopted is 1 hr. 13 min. 54·76 sec. E., from which the above result differs but little.

GENERAL.

Karl Ernst von Baer as Geographer.—The twenty-third issue of the *Münchener Geographische Studien* is devoted to a critical review, by Alfred Heydenreich, of Baer's services to the cause of Geography, the paper being illustrated by three sketch-maps and supplied with a brief bibliography and index of names. Politically Russian and a zealous patriot of Russia to boot, in genius German, born in Estland, studying in Dorpat and German universities, and from 1834 Professor of Zoology at St. Petersburg, Baer was no exclusive specialist in geography or other departments of science. He was much rather a student of natural science in its integrity, appreciating each particular science in relation to the whole. It was only after a long course of study in zoology, anatomy, and embryology, after officiating at Königsberg University first as Prosector and then as Professor of Zootomy, and while filling the chair of zoology at St. Petersburg, that Baer turned his energies to geography. And in the field of geography it was its vital connection with anthropology that especially, ultimately almost exclusively, engaged his interest. Baer's appetite for geographical travel dates more particularly from his Königsberg days. He then made the acquaintance of Zivolka, already at home in the White Sea, who told his eager listener tales of whale-fishing, and gave him an inkling of the as yet but glimmeringly unveiled island of Novaya Zemlya. After greedily devouring all records of travel in the high north, Baer persuaded the St. Petersburg Academy to send him on an expedition to the island. A main impulse to this adventure was the thirst to find out "what flora Nature there contrived to maintain on so scant a pittance of resources." Apart from his general science and exceptional powers of observation, Baer's intrinsic outfit for the expedition may be gathered from two elaborate reports to the Academy on recent discoveries on the coast, and on the climate of Novaya Zemlya. The rich scientific results of the three months' exploration are gathered up in five articles embodied in the Academy's Bulletins, comprehending flora, fauna, geology, climate, zoogeography, and altitudes —all appreciated by a catholic scientific sense in their causal interrelation. Thirty years after this expedition he recalls, as among the most grateful of its memories, that of the immense, solemn, inviolable stillness brooding over the land. The meteorological observations of the next expedition (1838–39) served to confirm Baer's conjecture that the warmer temperature of the west end of Matochkin Shar was but an inadequate representation of the difference of temperature between the west and the east coast of the island. Consequent on his travels, Baer's science, never out of touch with geography, took a more decidedly geographical leaning. In 1839, in conjunction with Helmersen, he founded a journal, in the early numbers of which is a definition of geography which, did space permit, would be worth quoting here. In 1845, he took a prominent part in the founding of the Geographical Society at St. Petersburg. The monograph includes an account of Baer's interpretation of the Homeric geography and his transfer of Odysseus' wanderings to the region of the Black sea, with a reference also to his relegation of Ophir to

Malacca. Considerable as were Baer's positive contributions to geography, much more considerable still was the scientific impulse he imparted to its study.

Honour to Mr. Ravenstein.—We learn with much pleasure that the honorary degree of Doctor of Philosophy has been conferred on Mr. E. G. Ravenstein by the University of Göttingen, on the proposal of Dr. Hermann Wagner. The immediate occasion for the conferring of this well-deserved honour has been the publication of the important work on Martin Behaim noticed in the present number of the *Journal*.

Murchison Award.—In the report of the remarks made by the President at the meeting of April 5, p. 610 of the May *Journal*, there is a mistake with reference to the award of the Murchison Bequest. As is stated in the note on p. 594, this was awarded to Captain C. G. Rawling for his valuable explorations in North-Western Tibet.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1908–1909.

Fourteenth Meeting, May 10, 1909.—Major Leonard Darwin, President, in the Chair.

Elections.—*Maurice Marcel Allorge*; *Roger Charles Anderson, R.N.V.R.*; *Captain F. W. Barrett* (*15th Hussars*); *Henry John Brown*; *Dr. H. W. McConnell*; *John Corbett*; *Captain Jeoffrey Hewart*; *Captain B. E. A. Pritchard*; *Henry Edward Sly*; *Don C. Sowers*.

The paper read was:—

"The Western Pacific." By Sir Everard F. im Thurn, K.C.M.G., C.B.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are as a rule written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
k.k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s)
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Austria—Bosnia and Herzegovina. **Whitwell.**

Through Bosnia and Herzegovina with a paint-brush. By Mrs. E. R. Whitwell. Darlington (London: Simpkin & Co.), [1909]. Size 8½ × 5½, pp. vi. and 76. *Illustrations. Price 6s. net. Presented by the Author.*

Austria—Seismology. **Zentralanstalt für Meteorologie.**

Allgemeiner Bericht und Chronik der im Jahre 1906 in Österreich beobachteten Erdbeben. No. III. Herausgegeben von der K.K. Zentralanstalt für Meteorologie und Geodynamik. Vienna, 1908. Size 9 × 6, pp. vi. and 200.

France—Cartography. **Vallée.**

Bibliothèque Nationale. Catalogue des plans de Paris et des Cartes de l'Ile de France, de la Généralité, de l'Election, de l'Archevêché, de la Vicomté, de l'Université, du Grenier à sel et de la Cour des Aydes de Paris conservés à la Section des Cartes et Plans. Par Léon Vallée. Paris: H. Champion, 1908. Size 10 × 6½, pp. ii. and 578. *Price 20 fr.*

France—Central. **Levainville.**

Capitaine J. Levainville. Le Morvan: étude de géographie humaine. Paris: A. Colin, 1909. Size 10 × 6½, pp. 306. *Maps and Illustrations. Price 10 fr. Presented by the Publisher.*

Germany. **Harms.**

Erdkunde in entwickelnder, anschaulicher Darstellung. Von H. Harms. I. Band: Vaterländische Erdkunde, mit Anhang: Deutschlands Kolonien. 8ᵉ Auflage. Leipzig: List & von Bressensdorf, 1909. Size 9 × 6, pp. xvi. and 526. *Maps and Illustrations. Price 5m.*

Germany. **Zweck.**

Deutschland, nebst Böhmen und dem Mündungsgebiet des Rheins. Die geographische Gestaltung des Landes als Grundlage für die Entwickelung von Handel, Industrie und Ackerbau mit besonderer Berücksichtigung der Seestädte. Von Prof. Dr. Albert Zweck. Leipzig, etc.: B. G. Teubner, 1908. Size 9 × 6, pp. x. and 238. *Sketch-maps and Illustrations. Price 4m.*

Italy—Central. **Baedeker.**

Central Italy and Rome. Handbook for travellers. By Karl Baedeker. 15th edit. Leipzig, 1909. Size 6½ × 4, pp. lxxxii., 528, and 24. *Maps and Plans. Price 7s. 6d. Presented by the Editor.*

Italy—Sicily. *B.S.G. Italiana* **10** (1909): 50–56. **Crinò.**

I Monti Erei. Del prof. Sebastiano Crinò.

On the identification of these mountains mentioned by the ancient writers.

Italy—Venetia. *Scritti G. e. Storia G. concernenti l'Italia* (1908): 77–103. **Musoni.**

Le sedi umane nel bacino medio del Natisone (Friuli). Di Francesco Musoni. *Sketch-map.*

Mediterranean—Archæology. **Montauzan.**

Nouvelles Archives Missions Sc. **15** (1907): 71–123.

Rapport sur une mission scientifique en Italie et en Tunisie. Par C. Germain de Montauzan. *Plans and Illustrations.*

Norway. *Tenth Rep. Michigan A. Sc.* (1908): 23–29. **Jefferson.**

Man in West Norway. By Mark Jefferson. *Illustration.*

Russia—Warsaw. **Arctowski.**

Les variations séculaires du climat de Varsovie. Par H. Arctowski. (Odbitka z "Prac matematyczno-fizycznych," T. xix.) Warsaw, 1908. Size 10 × 7, pp. 24. *Diagrams.*

Scandinavia—Relief. **Wråk.**

Bidrag till Skandinaviens Reliefkronologi. Akademisk Avhandling . . . av Walter Wråk. (Avtryck ur Ymer 1908.) Stockholm, 1908. Size 9½ × 6, pp. 98. *Maps and Illustrations.*

Spain—Galicia. **Meakin.**

Galicia: the Switzerland of Spain. By Annette M. B. Meakin. London: Methuen & Co., [1909]. Size 9 × 5½, pp. xii. and 376. *Sketch-map and Illustrations. Price 12s. 6d. net. Presented by the Publishers.*

Spain—Zamora. *B.R.S.G. Madrid* **50** (1908): 273–304. **Ciria y Vinent.**
La provincia di Zamora y el lago di San Martin de Castañeda. Por Joaquin de Ciria y Vinent. *Illustrations.*

Sweden—Hydrology. *B. Geol. I. Upsala* **8** (1906–7): 1–72. **Wallén.**
Régime hydrologique du Dalelf. Par A. Wallén. *Maps and Diagrams.*

Switzerland. *Scottish G. Mag.* **25** (1909): 1–11. **Avebury.**
The scenery of Switzerland. By Lord Avebury. *Illustrations.*

Switzerland—Anthropology. **Schenk.**
B.S. Neuchateloise G. **18** (1907): 106–165; **19** (1908): 5–57.
Etude sur l'anthropologie de la Suisse. Par le Dr. Alexandre Schenk. *Illustrations.*

Switzerland—Languages. *Questions Diplomatiques* **26** (1908): 289–303. **Henry.**
Les langues française et allemande en Suisse. Par René Henry. *Sketch-maps.*
A previous paper by the same author was referred to in vol. **30**, p. 210.

Switzerland—Rivers. *B.S. Neuchateloise G.* **19** (1908): 69–95. **Michel.**
Contribution à l'étude des cours d'eau du plateau fribourgeois. Affluents du groupe de la Sonnaz-Bibera (Basse-Sarine, rive gauche). Par le Dr. G. Michel. *Sketch-maps, sections, and Illustrations.*

Turkey—Novibazar. *G.Z.* **14** (1908): 652–657. **Schultze.**
Die Bedeutung des Sandshak Nozipazar. Von Ernst Schultze.

United Kingdom—Devon. **Somervail.**
Ancient and perished volcanoes of Devon. By Alexander Somervail. (Reprinted from the *Transactions of the Devonshire Association for the Advancement of Science*, etc., vol. **40**, 1908, pp. 201–218.) Size 8½ × 5½, pp. 18.

United Kingdom—Essex. **Bosworth.**
Cambridge County Geographies. (Edited by F. H. H. Guillemard.) Essex. By George F. Bosworth. Cambridge University Press, 1909. Size 7½ × 5, pp. viii. 166. *Maps and Illustrations. Price* 1*s.* 6*d. Presented by the Publishers.*

United Kingdom—Hull. **Travis-Cook.**
Notes on the origin of Kingston-upon-Hull, and of the port of Hull; also on the Camin Charter, the Meaux register (including the "old" river Hull tradition), and glimpses of Mediæval Hull. By J. Travis-Cook. London, etc.: A. Brown & Sons, [1909]. Size 8½ × 5½, pp. x. and 68. *Plans and Illustrations. Price* 2*s. net. Presented by the Publishers.*

United Kingdom—Ireland. **Priester.**
Die Oberflächengestalt und Lage Irlands und ihre verkehrsgeographische Ausnutzung durch den Menschen. Von Dr. Hermann Priester (Geographische Arbeiten, herausgegeben von Dr. Willi Ule. II.). Stuttgart: Strecker & Schröder, 1909. Size 8½ × 6, pp. viii. and 104. *Price* 3.50*m. Presented by the Publishers.*

United Kingdom—Lincolnshire. **Dunston.**
The Rivers of Axholme, with a history of the navigable rivers and canals of the district. By G. Dunston. London, etc.: A. Brown & Sons, [1909]. Size 11 × 8½, pp. xiv. and 156. *Plans, Illustrations, and Section. Price* 10*s. net. Presented by the Publishers.*

United Kingdom—London. *London Topographical Record* **5** (1908): 117–135. **Spiers.**
Morden and Lea's plan of London, 1682. By Walter S. Spiers.

United Kingdom—South-East England. **Bosworth.**
Cambridge County Geographies. (Edited by F. H. H. Guillemard.) Kent. By George F. Bosworth (pp. viii. and 146). Surrey. By the same (pp. viii. and 152). Sussex. By the same (pp. viii. and 144). Cambridge: University Press, 1909. Size 7½ × 5. *Maps and Illustrations. Price* 1*s.* 6*d. per vol. Presented by the Publishers.*

ASIA.

Central Asia. **Lacoste.**
Around Afghanistan. By Major de Bouillane de Lacoste. London: Sir A. Pitman & Sons, 1909. Size 9½ × 6½, pp. xxxii. and 218. *Sketch-maps and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

Central Asia. **Pumpelly.**

Explorations in Turkestan: Expedition of 1904. Prehistoric civilizations of Anau: origins, growth, and influence of environment. Edited by Raphael Pumpelly. Two vols. Washington: Carnegie Institution, 1908. Size 11½ × 9½, pp. xxxvi., vi., 494, x., and x. *Maps and Illustrations. Presented by the Editor.*

China—Yunnan. **Davies.**

Yün-nan: the link between India and the Yangtze. By Major H. R. Davies. Cambridge: University Press, 1909. Size 9½ × 6, pp. xii. and 432. *Map and Illustrations. Price* 16*s. net. Presented by the Publishers.*

Cyprus—Historical. **Mariti and Cobham.**

Travels in the Island of Cyprus, translated from the Italian of Giovanni Mariti by Claude Delaval Cobham; with contemporary accounts of the sieges of Nicosia and Famagusta. Cambridge: University Press, 1909. Size 7½ × 5, pp. viii. and 200. *Price* 4*s. net. Presented by the Author.*

Eastern Asia. **Mersier.**

Cinquante histoires d'Extrême-Orient, mises en français d'après les textes malais, annotées et précédés d'un coup d'œil sur la Malaisie. Par Albert Mersier. Paris: Société Générale d'Impression, 1908. Size 8½ × 5½, pp. 170. *Presented by the Author.*

An interesting collection of extracts from Malay texts.

Eastern Asia. **Zepelin.**

Der ferne Osten; seine Geschichte, seine Entwickelung in der neusten Zeit und seine Lage nach dem russisch-japanischen Kriege. Von C. von Zepelin. II. Teil. Berlin: Zuckschwerdt & Co., 1909. Size 9½ × 6½, pp. viii. and 186. *Sketch-maps. Price* 6*s.* 6*d.*

India—North-West Frontier. **Pennell.**

Among the wild tribes of the Afghan frontier: a record of sixteen years' close intercourse with the natives of the Indian marches. By T. L. Pennell, M.D. London: Seeley & Co., 1909. Size 9 × 5½, pp. 324. *Maps and Illustrations. Price* 16*s. net. Presented by the Publishers.*

India—Survey. ———

General Report on the operations of the Survey of India . . . during 1906–07. Prepared under the direction of Colonel F. B. Longe. Calcutta, 1908. Size 13 × 8½, pp. iv., 68, and iv. *Maps and Illustrations.*

Indian Ocean—Andamans and Nicobars. ———

Local Gazetteer: the Andaman and Nicobar Islands. Calcutta, 1908. Size 9½ × 6, pp. iv. and 168. *Presented by the Secretary for India.*

Japan—Lake Nojiri. **Tanaka and Hirasawa.**

J. Tōkyō G.S. **20** (1908): 31–41, 90–102, 185–191.

Lake Nojiri. By Akamaro Tanaka and Fukumatsu Hirasawa. *Sketch-map and Diagrams.*

Malay Archipelago—Celebes. **Kruijt.**

Ts. K. Nederland. Aardr. Genoots. **25** (1908): 1271–1844.

De berglandschappen Napoe en Besoa in Midden-Celebes. *Map and Illustrations.*

Malay Archipelago—Sumatra. **Volz.**

Ts. K. Nederland. Aardr. Genoots. **25** (1908): 1345–1382.

Kartographische Ergebnisse meiner Reisen durch die Karo- und Pakpak-Batakländer. Von Prof. Dr. Wilhelm Volz. *Maps and Illustrations.*

Malay Archipelago—Sumatra. **Vuuren.**

Ts. K. Nederland. Aardr. Genoots. **25** (1908): 1389–1402.

De handel van Baroes, als oudste haven op Sumatra's westkust, verklaard; en voor de toekomst beschouwd; door L. van Vuuren. *Sketch-maps.*

Russia—Siberia—Kamchatka. *Globus* **94** (1908): 224–225. **Jochelson.**

Die Riabouschinsky-Expedition nach Kamtschatka. Von Waldemar Jochelson.

Siam—Historical. **Fournereau.**

Le Siam ancien: archéologie; épigraphie; géographie. Par Lucien Fournereau. 2e partie. (Ministère de l'Instruction Publique: Annales du Musée Guimet, Tome xxxi^e, 2e partie.) Paris: E. Leroux, 1908. Size 11 × 9, pp. iv. and 140. *Plans and Illustrations. Price* 30 *fr.*

Continuation (brought out, since the author's death, under the supervision of M. A. Barth) of the work begun in 1895.

Turkey—Baghdad Railway. **Fraser.**

The short cut to India: the record of a journey along the route of the Baghdad railway. By David Fraser. Edinburgh, etc.: W. Blackwood & Sons, 1909. Size 9 × 5½, pp. xiv. and 382. *Map and Illustrations. Price* 12*s.* 6*d. net. Presented by the Publishers.*

See Review, *ante*.

Turkey—Kurdistan—Historical. **Toffteen.**

Researches in Assyrian and Babylonian geography. Part i. By Dr. Olaf A. Toffteen. Chicago: University of Chicago Press, 1908. Size 9½ × 6½, pp. 60. *Maps. Presented by the Publishers.*

Turkey—Palestine. **Huntington.**

B. American G.S. **40** (1908): 513–522, 577–586, 641–652.

The climate of ancient Palestine. By Ellsworth Huntington. *Sketch-map, Plans, and Diagrams.*

On possible historic changes of climate (see Monthly Record, March, p. 326).

Turkey—Palestine. **Crawley-Boevey.**

Quart. Statement, Palestine Explor. Fund (1909): 64–68.

Map and description of Jerusalem by Christian van Adrichem (1533–1585). By A. W. Crawley-Boevey.

Turkey—Syria. **Lammens.**

Université Saint-Joseph; Mélanges, Faculté Orientale **1** (1906): 239–283.

Notes de géographie syrienne. Par le P. Henri Lammens. Le district syrien du Gâzr (pp. 239–242). La description du Liban d'après Idrisi (pp. 242–249). Topographie franque du Liban (pp. 250–271). Les Nosairis et les "Galilæens" de Sozomène (pp. 271–283).

Western Asia. *G. Anzeiger* **9** (1908): 145–148, 170–175, 196–199. ——

Dr. Hugo Grothes Studienreise durch Vorderasien (1906 u. 1907). *Maps.*

AFRICA.

Africa—Geodesy. **Darwin.**

British Association, Section A, Dublin, 1908. Report of the Committee . . . appointed to co-operate in the measurement of a further portion of the geodetic arc of meridian north of Lake Tanganyika. (Drawn up by Sir G. Darwin.) [London, 1908.] Size 8½ × 5½, pp. 2. *Map.*

Belgian Congo. **Vandervelde.**

Emile Vandervelde. Les derniers jours de l'Etat du Congo. Journal de voyage (Juillet–Octobre 1908). Paris, etc., 1909. Size 9½ × 6½, pp. 198. *Illustrations. Presented by the Author.*

In spite of the shortness of the author's stay on the Congo, he appears to have made good use of his opportunities for observation.

Canary Islands. **Proust and Pitard.**

L. Proust et J. Pitard. Les Iles canaries: description de l'archipel. Paris: E. Guilmoto, [1909]. Size 10 × 6½, pp. 320. *Map and Illustrations. Price* 10 *fr. Presented by the Publisher.*

Egypt—Survey. **Lyons.**

Survey Department, Egypt. The cadastral survey of Egypt, 1892–1907. By Captain H. G. Lyons. Cairo, 1908. Size 10½ × 7, pp. viii. and 422. *Maps, Plans, Illustrations, and Diagrams. Two copies, presented by the Author and the Survey Department.*

German South-West Africa. *Z. Ges. E. Berlin* (1908): 664–687. **Range.**

Reisestudien in Gross-Namaland. Von Dr. Paul Range. *Sketch-map and Illustrations.*

Ivory Coast—Forest. *Rev. française* **33** (1907): 584–594. **Chevalier.**

Côte d'Ivoire: la forêt vierge. Par le Dr. Auguste Chevalier.

Kamerun. **Zimmermann.**

Durch Busch und Steppe vom Campo bis zum Schari, 1892–1902. Ein Beitrag zur Geschichte der Schutztruppe von Kamerun. Von Oscar Zimmermann. Berlin: E. G. Mittler u. S., 1909. Size 9½ × 6½, pp. vi. and 238. *Map and Illustrations. Price* 5*m.*

Experiences of an officer who has taken part in many expeditions in the interior of the Kamerun.

Madeira. **Koebel.**

Madeira: Old and New. By W. H. Koebel. London: T. Griffiths, 1909. Size 9 × 6, pp. xvi. and 216. *Maps and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publisher.*

Nigeria and Kamerun—Waterway. **Marquardsen.**

Der Niger-Benue, eine historisch-geographische Beschreibung der natürlichen Verbindung Nord-Kameruns mit der Küste. Von Hugo Marquardsen. Berlin: W. Süsserott. 1909. Size 9½ × 6½, pp. 82. *Map and Illustr. Presented by the Author.*

A useful summary of our knowledge of the Niger-Benue route into the interior, which the writer has twice made use of himself.

Red Sea—Pearl-Fishery. **Kaiser.**

Perlfischerleben im Roten Meere. Von Alfred Kaiser. (Separat-Abdruck aus den *Mitteilungen der Ostschweizerischen geographisch-commerciellen Gesellschaft*, Heft 2.) Size 9 × 6½, pp. 16.

Sahara—Ethnography. *B.S.G. Oran* **28** (1908): 325–368. **Voinot.**

Notes pour servir à l'étude de l'ethnographie ancienne du Sahara central. Par L. Voinot. *Sketch-map, plans, and Illustrations.*

São Thomé. *Nouvelles Archives Missions Sc.* **15** (1907): 61–70. **Gravier.**

Rapport sur une mission scientifique à l'Ile de San Thomé (Golfe de Guinée). Par Charles Gravier.

South Africa—Zoology. *J. African S.* **8** (1909): 113–129. **Selous.**

Big game in South Africa and its relation to the tse-tse fly. By F. C. Selous.

Sudan. *La G., B.S.G. Paris* **18** (1908): 209–226. **Bordeaux.**

Deux contre-rezzous dans l'Ouaddaï, l'Enndi et le Borkou. Par le Commdt. Bordeaux. *Map.*

See p. 498, *ante*. The map embodies also the results of an itinerary of Lieut. Gauckler.

Transvaal. *Scottish G. Mag.* **25** (1909): 12–18. **Macdonald.**

The agricultural potentialities of the Transvaal. By William Macdonald.

Transvaal—Ethnology. **Wessmann.**

The Bawenda of the Spelonken (Transvaal): A contribution towards the psychology and folk-lore of African peoples. By R. Wessmann. Translated . . . by Leo Weinthal. London: The *African World*, Ltd., 1908. Size 7½ × 5, pp. 154. *Sketch-map and Illustrations. Presented by the 'African World.'*

Transvaal—Geological Survey. ———

Transvaal Mines Department. Report of the Geological Survey for the year 1907. Pretoria, 1908. Size 11 × 8½, pp. vi. and 116. *Maps, Plans, Sections and Illustrations. Price* 7*s.* 6*d.*

Uganda—Victoria Nyanza. *Cairo Sc. J.* **2** (1908): 385–391. **Lyons.**

Earth-movements at Lake Victoria. By Capt. H. G. Lyons. *Diagrams.*

See note in the March number, p. 328.

NORTH AMERICA.

America—Historical. **Anghiera and Gaffarel**

Recueil de voyages et de documents pour servir à l'histoire de la géographie. . . . . Tome xxi. De orbe novo, de Pierre Martyr Anghiera. Les huit décades, traduites du Latin, avec notes et commentaires par Paul Gaffarel. Paris: E. Leroux. 1907. Size 11 × 7½, pp. 756. *Price* 40 *fr.*

A modern edition of this famous work, with explanatory footnotes, is now issued for the first time.

Canada—Historical. **Lucas.**

A history of Canada, 1763–1812. By Sir C. P. Lucas. Oxford: Clarendon Press, 1909. Size 9 × 5½, pp. vi. and 360. *Maps. Price* 12*s.* 6*d. Presented by the Publishers.*

Canada—Nova Scotia. **Fletcher**

Canada: Department of Mines; Geological Survey. Summary Report on Explorations in Nova Scotia, 1907. By Hugh Fletcher. Ottawa, 1908. Size 9½ × 6½, pp. 16.

Canada—Petroleum. *T. Nova Scotian I. Sc.* **11** (1906–07): 598–622. **Ells.**

The oil-fields of Eastern Canada. By R. W. Ells.

Canada—Rockies. *Canadian Alpine J.* **1** (1908): 224–231. **Coleman.**
The causes of mountain forms in the Canadian Rockies. By A. P. Coleman. *Illustrations.*

Canada—Rockies. *Canadian Alpine J.* **1** (1908): 249–263. **Sherzer.**
The nature and activity of Canadian glaciers. By William Hittell Sherzer. *Illustrations.*

Mexico—Volcanoes. **Danneberg.**
Verh. Naturhist. V. preuss. Rheinlande **64** (1907): 97–133.
Beobachtungen an einigen Vulkanen Mexikos. Von A. Danneberg. *Illustrations.*

Mexico—Yucatan. *La G., B.S.G. Paris* **18** (1908): 227–238. **Périgny.**
Le Yucatan inconnu. Par le Comte Maurice de Périgny.

Niagara. *Popular Sci. Monthly* **73** (1908): 289–305. **Spencer.**
Spoliation of the Falls of Niagara. By Dr. J. W. Spencer. *Sketch-maps and Illustrations.*

North America. **Afialo.**
Sunset playgrounds; fishing days and others in California and Canada. By F. G. Afialo. London: Witherby & Co., 1909. Size 9 × 5½, pp. xii. and 252. *Illustrations. Price* 7*s.* 6*d. net. Presented by the Publishers.*

North America—Morphology. *J. Geology* **16** (1908): 347–356. **Robinson.**
Ancient water-planes and crustal deformation. By H. H. Robinson.

United States—Colorado. *Colorado Coll. Publs., Sc. Ser.* **12** (1907): 92–98. **Loud.**
A comparison of temperatures (1906) between the Colorado Springs and Lake Moraine. By F. H. Loud.

United States—Maryland. **Peabody.**
The exploration of Bushey Cavern, near Cavetown, Maryland. By Charles Peabody. (Phillips Academy, Andover: Department of Archæology: Bulletin IV., Part 1.) Andover, Mass., 1908. Size 9½ × 6, pp. 3–25. *Plan, Illustrations, and Diagrams.*

United States—New Mexico. **Johnson.**
Volcanic necks of the Mount Taylor region, New Mexico. By Douglas Wilson Johnson. (*Bulletin of the Geological Society of America*, vol. **18**, pp. 300–324.) New York, 1907. Size 10 × 6½, pp. (22). *Sketch-map, Sections, and Illustrations.*

CENTRAL AND SOUTH AMERICA.

Bolivia. **Brabant.**
William van Brabant. La Bolivie. Paris, etc.: J. Lebègue et Cie. [1908]. Size 10 × 6½, pp. 476. *Sketch-map and Illustrations. Price* 10 *fr.*

Bolivia—Anthropology. **Chervin.**
Mission scientifique G. de Créqui Montfort et E. Sénéchal de la Grange. Anthropologie bolivienne. Par le Dr. Arthur Chervin. Three vols. Paris: Imprimerie Nationale. 1907–08. Size 11 × 7½, pp. (vol. **1**) xl. and 412; (vol. **2**) 436; (vol. **3**) 152. *Maps and Illustrations. Presented by the Author.*

The geographical results of this mission have been several times referred to in the *Journal.*

Chile. **Martin.**
Landeskunde von Chile. Aus dem Nachlass von Dr. Carl Martin für den Druck durchgesehen von Prof. Dr. Paul Strange. (Publikation des Geographischen Instituts der Universität Jena.) Hamburg: L. Friederichsen & Co., 1909. Size 10 × 7, pp. xxviii. and 778. *Portrait, Map, and Illustrations. Price* 20 *m. Presented by the Publishers.*

A detailed and systematic geography of Chile.

Colombia. **Triana.**
Miguel Triana. Por el Sur de Colombia; excursion pintoresca y científica al Putumayo. Paris: Garnier Frères, [1908]. Size 8½ × 5½, pp. xxiv. and 356. *Map and Portrait. Presented by the Author.*

Panama Canal. **Cornish.**
The Panama Canal and its builders. By Vaughan Cornish, D.Sc. London: T.

Fisher Unwin, 1909. Size 8½ × 5½, pp. 192. *Maps, Sections, and Illustrations. Price 5s. Presented by the Publisher.*

Peru—Historical. **De la Rosa.**

Découverte de trois précieux ouvrages du Métis péruvien Blas Valera, qu'on croyait détruits en 1596. Par Manuel Gonzalez de la Rosa. (Extrait du *Journal de la Société des Américanistes de Paris*, Nouv. Série, tome iv., numéro 2.) Paris, 1908. Size 11 × 7, pp. 16.

The "discovery" of the title refers to the writer's claim to have demonstrated that the lost works, or large parts of them, were incorporated into the productions of Garcilasso and others.

Peru—Huarochiri. **Turner.**

B. Cuerpo Ingenieros de Minas, Peru, No. **60** (1908): pp. 48.

Las lagunas de Huarochirí y su futuro ensanche. Por W. T. Turner. *Maps.*

Peru—Irrigation. **Marsters.**

B. Cuerpo Ingenieros de Minas, Peru, No. **59** (1908): pp. 44.

Dos informes sobre los valles de Ilo, Moquegua ó Ica. Por V. F. Marsters. *Sketch-maps, Section, and Illustrations.*

Discusses the geography and hydrology from the point of view of irrigation.

Peru—Minerals. *B. Cuerpo Ingenieros de Minas, Peru*, No. **62** (1908): pp. 198. **Dueñas.**

Fisionomia minera de las provincias de Tayacaja, Angaraes y Huancavelica. Por Enrique I. Dueñas. *Sketch-maps, Illustrations, and Section.*

South America—Paraguay Tea. *B.S.G. Com. Paris* **30** (1908): 721-744. **Walle.**

Dans les hervacs. Par P. Walle. *Illustrations.*

Observations during a stay among "yerba" forests of Paraguay and Brazil.

West Indies. **Dupontès.**

P. Chemin Dupontès. Les petites Antilles: étude sur leur évolution économique. Paris: E. Guilmoto, 1909. Size 9 × 5½, pp. viii. and 362. *Map. Price 7.50 fr. Presented by the Publisher.*

West Indies—Martinique. *B. American G.S.* **40** (1908): 662-679. **Hovey.**

Ten days in camp on Mount Pelé, Martinique. The volcano six years after the great eruption. By Edmund Otis Hovey. *Illustrations.*

POLAR REGIONS.

Antarctic—French Expedition. **Charcot and others.**

Expédition antarctique française (1903-1905), commandée par le Dr. Jean Charcot. Journal de l'expédition, par J.-B. Charcot (pp. 120); Sciences naturelles: Documents scientifiques: Géographie physique; glaciologie; pétrographie, par E. Gourdon (pp. 214); Vers et brachiopodes: Némertiens, par L. Joubin; Géphyriens, par M.-A. Herubel; Brachiopodes, par D. P. Œhlert (pp. 16, 8, and 4); Crustacés: Isopodes (2e. mémoire), par Harriett Richardson; Ostracodes marins, par E. de Daday (pp. 8 and 16); Botanique: Lichens, par Hue; Diatomacées, par Petit (pp. 18 and 4); Flore microbienne, par Mlle. Tsiklinsky (pp. 34); Spongiaires et Cœlentérés: Alcyonaires, par L. Roule; Méduses, par le Dr. Otto Maas; Animal pélagique, par Bedot; Spongiaires, par E. Topsent (pp. 8, 20, 8, and 38). Paris: Masson & Cie., 1908. Size 11 × 9. *Maps and Illustrations. Presented by the Ministère d'Instruction Publique.*

Antarctic—Swedish Expedition.

Wissenschaftliche Ergebnisse der schwedischen Südpolar-Expedition 1901–1903 unter Leitung von Dr. Otto Nordenskjöld. Band II., Lief. 1 und 2 (pp. 22 and 364); Band III., Lief. 4 und 8 (pp. 4 and 34). Stockholm, 1908. Size 10½ × 8½. *Maps and Illustrations.*

Arctic—Novaya Zemlia. **Orléans.**

Duc d'Orléans. La revanche de la banquise: un été de dérive dans la mer de Kara. Juin-Septembre, 1907. Paris: Librairie Plön, 1909. Size 12½ × 10, pp. 288 and 46. *Maps and Illustrations. Presented by the Duke of Orleans.*

See review, *ante*, p. 708.

Arctic—Siberian Coasts. **Toll.**

Die russische Polarfahrt der "Sarja," 1900–1902. Aus den hinterlassenen Tagebüchern von Baron Eduard von Toll herausgegeben von Baronin Emmy von Toll. Berlin: G. Reimer, 1909. Size 9½ × 6½, pp. iv. and 636. *Portrait, Map, and Illustrations. Price 14m. Presented by the Publisher.*

MATHEMATICAL GEOGRAPHY.

Compass. **Chetwynd.**

An explanation of the adjustment of ships' compasses. By Commr. L. W. P. Chetwynd. London: J. D. Potter, 1909. Size 9½ × 6, pp 24. *Diagrams. Price 2s. Presented by the Publisher.*

Surveying. **Breed and Hosmer.**

The principles and practice of Surveying. Vol. 2. Higher surveying. By Charles B. Breed and George L. Hosmer. New York: J. Wiley & Sons (London: Chapman & Hall), 1908. Size 9 × 6, pp. xviii. and 432. *Maps, Diagrams, and Illustrations. Price 10s. 6d. Presented by the Publishers.*

Surveying. **Wharton and Field.**

Hydrographical surveying. A description of means and methods employed in constructing marine charts. By the late Rear-Admiral Sir William J. Wharton. A New Edition, revised and enlarged by Rear-Admiral Mostyn Field. London: J. Murray, 1909. Size 9 × 6, pp. viii. and 476. *Charts and Diagrams. Price 21s. net. Presented by the Publisher.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Oceanography—Atlantic and Mediterranean. ———

B.I. Océanogr. Monaco, No. 126 (1908): pp. 12.

Campagne scientifique de la *Princesse Alice* (1908). Liste des stations. *Maps.*

Oceanography—Currents. **Marini.**

Marini Ludovico. Intorno alle basi per lo studio della circolazione marina. (Estratto dagli *Atti della R. Academia Peloritana*, vol. **23**, fasc. 1.) Messina, 1908. Size 9 × 6, pp. 58.

Oceanography—Fauna. **Monaco and Bouvier.**

Résultats des campagnes scientifiques accomplies sur son yacht par Albert Ier, Prince Souverain de Monaco. Fascicule 33: Crustacés décapodes (Pénéidés) provenant des campagnes de *l'Hirondelle* et de la *Princesse Alice* (1886–1907). Par E.-L. Bouvier. Monaco, 1908. Size 14 × 11, pp. 122. *Illustrations.*

Rivers. *B.A. Imp. Sc. St.-Petersburg*, 1908: 805–818. **Oppokof.**

Méthode simple servant à l'étude du régime des fleuves pendant plusieurs années et son application au bassin du Dnépr. Par E. V. Oppokov. *Diagrams.*

Seismology. *J. Tōkyō G.S.* **20** (1908): 135–147. **Omori.**

Earthquake Sound. By Fusakichi Omori. [In Japanese.]

Tides. *P.R.S.A.* **81** (1908): 448–449. **Rayleigh.**

Note on tidal bores. By Lord Rayleigh. *Diagram.*

Tides. *Ann. Hydrographie* **36** (1908): 532–541. **Wegemann.**

Ueber sekundäre Gezeitenwellen. Von Dr. Wegemann. *Sketch-maps.*

Tides. *G.Z.* **14** (1908): 447–461. **Wegemann.**

Moderne Methode der Gezeitenforschung. Von G. Wegemann.

Tide-tables. ———

Tide-tables for the British and Irish ports for the year 1909; also the times and heights of high water at full and change for the principal places on the globe. London: Hydrographic Department. [1908]. Size 9½ × 6, pp. xl. and 320. *Diagrams.*

Volcanoes. *Z. Ges. E. Berlin* 1908: 481–484. **Gagel and Jaeger.**

Ueber die Bezeichnung der vulkanischen Kesseltäler und Schluchten. Von Dr. C. Gagel.

Bemerkungen zu den Ausführungen von Dr. C. Gagel. Von Dr. Fritz Jaeger.

These papers continue a discussion between the two writers as to the terminology of certain morphological features of volcanoes.

Volcanoes—Pelée and Vesuvius. **Lacroix.**

La montagne Pelée après ses éruptions, avec observations sur les éruptions du Vésuve en 79 et en 1906. Par A. Lacroix. Paris: Masson & Cie., 1908. Size

12½ × 10, pp. viii. and 136. *Sketch-maps and Illustrations. Presented by the Ministère d'Instruction Publique.*

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Anthropogeography. **Reclus.**

Elisée Reclus. L'homme et la Terre, Tomes V. et VI. Paris: Librairie Universelle (1905-08). Size 11 × 8½, pp. (vol. 5) 576; (vol. 6) 580. *Maps and Illustrations. Presented by M. Paul Reclus.*

This important work is now complete, and will be specially reviewed.

Commercial—Canals. **Hepburn.**

Artificial waterways and commercial development (with a history of the Erie canal). By Dr. A. Barton Hepburn. New York (and London): Macmillan, 1909. Size 7½ × 5, pp. x. and 116. *Price 4s. net. Presented by the Publishers.*

Historical. *Scritti G. e Storia G. concernenti l'Italia* (1908): 323-370. **Almagià.**

Le dottrine geofisiche di Bernardino Telesio. Prima contributo ad una storia della geografia scientifica nel Cinquecento. Di Roberto Almagià.

Historical. **Isidoro, Blazquez, and Aguilera.**

B.R.S.G. Madrid **50** (1908): 207-272, 306-358.

San Isidoro de Sevilla. Mapa Mundi, publicado por Antonio Blázquez y Delgado Aguilera. *Facsimile-map.*

The 'Mapa Mundi' of Isidore (a treatise, not a map) is here printed for the first time in Spanish. The facsimile reproduces the Madrid example (1047 A.D.) of the "Beatus" group of early maps (cf. *Journal*, vol. **14**, pp. 621 *et seq.*).

Historical—Early Travel. **Elter.**

Anton Elter. Itinerarstudien. (Programm zur Feier des Geburtstages Seiner Majestät des Kaisers und Königs am 27 Januar 1908, herausgegeben vom Rektor und Senat der Rheinischen Friedrich-Wilhelms Universität.) Bonn, 1908. Size 11 × 9, pp. 76.

Historical—Marco Polo. *J.R. Asiatic S.*, 1909: 151-162. **Houtum-Schindler.**

Marco Polo's travels: new editions. His "arbre sol" not "sun tree," but cypress of Zoroaster. By A. Houtum-Schindler.

The cypress is the Persian *dirakt i Sol.*

Historical—Pacific. **Dahlgren.**

Les relations commerciales et maritimes entre la France et les côtes de l'Océan Pacifique (commencement du XVIII^e^ siècle). Par E. W. Dahlgren. Tome **1**: Le commerce de la Mer du Sud jusqu'à la Paix d'Utrecht. Paris: H. Champion, 1909. Size 9½ × 6½, pp. xvi. and 740. *Facsimile maps. Presented by the Publisher.*

The first volume of an important work on which Mr. Dahlgren has been engaged for some years (cf. *Journal*, vol. **32**, p. 430).

Historical—Points of Compass. **Foy and Giese.**

M. Seminars Oriental. Sprachen **11** (1908): *II. Abt.* 234-247.

Die Windrose bei Osmanen und Griechen, mit Benutzung der Bahrijje des Admirals Pir-i-Re'is vom Jahre 1520 f. Ein fragment von Karl Foy. Aus dem Nachlasse herausgegeben von Friedrich Giese.

GENERAL.

Geography—Methods. **Davis.**

Die Methoden der amerikanischen geographischen Forschung. Von William Morris Davis. (Aus der "Internationale Wochenschrift für Wissenschaft, Kunst, u. Technik," 14. November, 1908.) Berlin, 1908. Size 11 × 8, pp. (4).

Local Geography. **Halkin.**

Les monographies de village. Par Joseph Halkin. Liége, 1908. Size 11 × 7½, pp. 8.

Urges a fuller consideration of geographical and geological factors in local studies.

Travel. **Hordern.**

Notes on the uses and possibilities of Ski. By Captain C. Hordern. [Typewritten sheets.] Size 13½ × 8½, 23 ll. *Illustrations.*

A summary of these notes appeared in the February number (p. 220).

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

Austria. **Freytag.**

G. Freytag's Ausflugskarte. Scale 1 : 100,000 or 1 inch to 1·3 stat. mile. Sheet: xix. Vienna: G. Freytag & Berndt, [1909]. *Presented by the Publishers.*

Austria—Vienna. **Freytag.**

G. Freytag's Verkehrsplan der k.k. Reichshaupt- und Residenzstadt Wien. Buch-Ausgabe. Scale 1 : 15,000 or 4·2 inches to 1 stat. mile. Vienna: G. Freytag & Berndt, 1909. *Price* 240 *kr. Presented by the Publishers.*

British Isles. **Philip.**

Philips' Handy Atlas and Gazetteer of the British Isles. A series of detailed county maps showing Local Government and Parliamentary Divisions, with maps illustrating Physical, Commercial, and Industrial Features, and a Gazetteer-Index of the British Isles containing 20,000 names. Edited by George Philip, F.R.G.S. London: George Philip & Son, Ltd., [1909]. *Price* 7*s.* 6*d net. Presented by the Publishers.*

The three small atlases of England and Wales, Scotland, and Ireland which have been published separately, and recently noticed in this *Journal*, bound together, with small-scale general meterological, geological, and physical maps of the British Isles added. A useful gazetteer index to place-names is given at the end.

British Isles—England and Wales. **Ordnance Survey.**

Sheets published by the Director-General of the Ordnance Survey, Southampton, from April 1 to 30, 1909.

1-inch (third edition):—

In outline, 100. 1*s.* (engraved).

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1 : 2500 Scale—County Maps:—

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(*E. Stanford, London Agent.*)

Portugal. **Serviço do Estado Maior.**

Carta dos Arredores de Lisboa. Scale 1 : 20,000 or 3·2 inches to 1 stat. mile. Sheets: 45–49, 53. Lisbon: Serviço do Estado Maior, 1905–07.

Turkey. **Schropp.**

Constantinople. Scale 1: 24,750 or 2·5 inches to 1 stat. mile. Berlin: Simon Schropp, [1909].

ASIA.

Ceylon. **Surveyor-General.**

Town of Nuwara Eliya. Scale 1: 12,672 or 5 inches to 1 stat. mile. Colombo: Surveyor-General's Office, 1908. *Presented by P. D. Warren, Esq., C.M.G., Surveyor-General of Ceylon.*

A useful plan of Nuwara Eliya, printed in colours. There are no contours, and heights are not indicated in any manner.

China. **Geographical Section, General Staff.**

Map of China showing Railways, Telegraphs, and Treaty Ports. Scale 1: 5,000,000 or 1 inch to 78·9 stat. miles. London: Geographical Section, General Staff, War Office, 1908. *Price* 1*s.* 6*d. Presented by the Director of Military Operations.*

Japan. **Teleki.**

Atlas zur Geschichte der Kartographie der Japanischen Inseln. Von Paul Graf Teleki. Budapest, 1909. *Presented by Count Paul Teleki.*

This atlas will be specially noticed.

AFRICA.

Cape Colony. **Cape Geological Commission.**

Geological map of the Colony of the Cape of Good Hope. Scale 1: 238,000 or 1 inch to 3·7 stat. miles. Sheets: 33, Britstown; 41, Griqua Town. Cape Town: Geological Commission, 1908-09. *Price* 2*s.* 6*d. each sheet. Presented by the Director, Geological Survey of the Cape of Good Hope.*

Egypt. **Survey Department, Cairo.**

Topographical Map of Egypt. Scale 1: 10,000 or 6·3 inches to 1 stat. mile. Aswan Province. Sheets: S.E. 120-33, 120-34, 121-35, 122-35, 122-36, 131-39. Cairo: Survey Department, 1909. *Presented by the Director-General, Survey Department, Cairo.*

Sahara. **Service Géographique des Colonies, Paris.**

Carte de la Mauritanie, dressée par M. le Capitaine du Génie Gérard, M. Merlaud-Ponty, étant Gouverneur Général de l'Afrique Occidentale Française et M. le Colonel Gourand, Commissaire du Gouvernement Général d'après les travaux des Officiers et Fonctionnaires en service dans le Territoire Civil de la Mauritanie depuis 1905. Scale 1: 1,000,000 or 1 inch to 15·8 stat. miles. Paris: Service Géographique des Colonies, 1909.

This map includes the little-known region of the Western Sahara between the Spanish territory of Rio de Oro and the Senegal. It is compiled from the route-sketches of the few French and other travellers who have visited the region, and is printed in colours. Special attention has been given to the location of wells.

Somaliland. **Service Géographique des Colonies, Paris.**

Carte de la Côte Française des Somalis. Scale 1: 500,000 or 1 inch to 7·9 stat. miles. Sheet 1, Djibouti. Paris: Service Géographique des Colonies, 1908.

A coloured map compiled from route surveys of travellers, whose names are given on the routes, and all other available information. Although the map is to consist of three sheets when complete, the present sheet includes the whole of French Somaliland, and the others will therefore show the territory immediately adjacent.

West Africa. **Service Géographique de l'Afrique Occidentale Française.**

Carte de l'Afrique Occidentale Française. Scale 1: 1,500,000 or 1 inch to 23·6 stat. miles. Sheet 4, Côte d'Ivoire, Dahomey, partie sud du Haut-Sénégal et Niger. Paris: Service Geographique du Gouvernement de l'Afrique Occidentale Française, [1909]. *Price* 2.50 *fr. each sheet.*

Sheet 4 of a four-sheet general map of French West Africa, of which the first to be published was noticed in the *Geographical Journal* for June, 1907. In addition to the French possessions, the map includes all the adjacent territories, and the present sheet extends from the coast to lat. 13° N., and from the Ivory Coast to the delta of the Niger. It is printed in colour, and forms a good map for general reference.

AMERICA.

Canada. **Department of the Interior, Ottawa.**

Sectional map of Canada. Scale 1: 190,080 or 1 inch to 3 stat. miles. Sheet 123, Fort Alexander, revised to October 9, 1908. Ottawa: Department of the Interior,

Topographical Surveys Branch, 1908. *Presented by the Department of the Interior, Ottawa.*

GENERAL.

World. **Geographical Section, General Staff.**

Cable map of the World. London: Geographical Section, General Staff, War Office, 1909. *Price* 1*s.* *Presented by the Director of Military Operations.*

World. **Habenicht and Domann.**

Hermann Berghaus: Chart of the World on Mercator's Projection. Entirely reconstructed by Hermann Habenicht and Bruno Domann. 14th edit. Two sheets. Gotha: Justus Perthes, 1909.

This is the 14th edition of this well-known general chart of the world, which was first published in 1863. On the whole, the work of revision has been carefully carried out; but in many parts the map lacks clearness, owing in great measure to the fact that the hill-shading and lettering are both in black.

World. **U.S. Hydrographic Office.**

Telegraphic Connections of the World afforded by the Submarine Cables and the Principal Overland Telegraph Lines. Two sheets. Washington: U.S. Hydrographic Office.

A chart of the world on Mercator's projection, measuring 35 by 60 inches. It shows clearly the lines of telegraph, both submarine and overland, and was first published in December, 1904. Extensive corrections have been made in this edition up to May, 1907.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, during March, 1909. *Presented by the Hydrographer, Admiralty.*

New Charts.

No.	Inches.	
3015 m	= 5·2	Scotland, west coast:—Loch na Keal. 3*s.*
3722 m	= 0·93, 7·90, 5·10	Red Sea:—Approaches to Mohamed Gul. Plans:—Mohamed Gul, Khor Ankeifail. 3*s.*
1798 m	= 0·74	China, north coast:—Kinchau to Terminal head, including Kwang tung peninsula. 4*s.*
3723 m	= 1·42	Pacific ocean:—Hermit islands. 2*s.*
2513 m	= 7·1	New Zealand:—Napier (Ahuriri) port and harbour. 3*s.*

New Plans and Plans added.

769 m	= 2·8, 2·8	Pacific ocean, Admiralty and Hermit islands. New plans:—Carola bay, Alacrity harbour. 2*s.*

Charts Cancelled.

No.	Cancelled by	No.
3015 Scotland, west coast—Loch na Keal.	New chart. Loch na Keal	3015
1109 Red sea:—Harbours and anchorages in the Red sea. Plans of Mohamed Gul and anchorage of Rawaya on this sheet.	New chart. Approaches to Mohamed Gul. Plans:—Mohamed Gul, Khor Ankeifail	3722
1798 China, north coast:—Kwang tung peninsula, including Dairen wan and the approaches to Port Arthur. Plan:—Odin cove.	New chart. Kinchau to Terminal head, including Kwang tung peninsula	1798
796 Pacific ocean:—Admiralty and Hermit islands. Plan of Hermit islands on this sheet.	New chart. Hermit islands	3723
2513 New Zealand:—Napier port and harbour.	New chart. Napier (Ahuriri) port and harbour	2513

New Editions.

1491, England, east coast:—Harwich harbour. 1772, Ireland, east coast:—Approaches to Wexford harbour. 2427, United States, east coast:—Salem, Marblehead, and Beverly harbours. 3408, Leeward islands:—Puerto Rico. 130, Leeward islands:—Anguilla to Puerto Rico. 1982*a*, South America, east coast:—River Paraná, sheet I. 1982*b*, South America, east coast:—River Paraná, sheet II. 666, Africa, east coast:—Port Mombasa. 945, Philippine islands:—Ports Masinlok and Matalvi. 2809, China, north-east coast:—Yang-tse-kiang:—Shanghai to Nanking. 2678, China, Yang-tse-kiang:—Nanking to Tung liu. 2695, China, Yang-tse-kiang:—Tung liu to Hankau. 3350, China:—Sketch of the Poyang lakes.

Indian Ocean and Red Sea. **Meteorological Office.**

Monthly meteorological charts of the Indian Ocean north of 15° S. lat. and Red Sea, May, 1909. London: Meteorological Office, 1909. *Price 6d. each. Presented by the Meteorological Office.*

North Atlantic and Mediterranean. **Meteorological Office.**

Monthly meteorological charts of the North Atlantic and Mediterranean, May, 1909. London: Meteorological Office, 1909. *Price 6d. each. Presented by the Meteorological Office.*

North Atlantic. **U.S. Hydrographic Office.**

Pilot chart of the North Atlantic Ocean, April, 1909. Washington: U.S. Hydrographic Office, 1909. *Presented by the U.S. Hydrographic Office.*

North Pacific. **U.S. Hydrographic Office.**

Pilot chart of the North Pacific Ocean, May, 1909. Washington: U.S. Hydrographic Office, 1909. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS AND SKETCHES.

Borneo, Japan, etc. **Garrett.**

One hundred and six photographs of Dutch Borneo, Japan, Formosa, and Straits of Malacca, taken by F. R. H. Garrett, Esq. *Presented by F. R. H. Garrett, Esq.*

The Japanese photographs are, with few exceptions, taken from the Nagano, Akita, and Hokkaido, and the oil-producing districts of Echigo, whilst those of Borneo are all from the protected state of Kutei on the east coast. The titles are as follows:—

Borneo:—(1–3) Balik Papan; (4) Balik Papan from the north; (5) Balik Papan from the south; (6) Road in Balik Papan; (7) Head of Balik Papan bay; (8) Javanese pilot and family at Balik Papan; (9) Bugis pineapple plantation at Balik Papan; (10) Part of refinery at Balik Papan; (11) Bandjarese family at Balik Papan; (12) Bandjarese and Bugis gambling at Balik Papan; (13) Javanese policeman in charge of a Bugis murderer at Balik Papan; (14–16) Bugis at Balik Papan; (17) Bugis weaving, Balik Papan; (18) Bugis and Bandjarese; (19) Bandjarese coolie; (20–22) Bandjarese; (23) Bandjarese and Javanese; (24) Orchid; (25) Oil outcrop at South Semboja; (26) South Semboja; (27) Bugis fishers' camp, South Semboja; (28) Danau, South Semboja; (29) Survey track, South Semboja; (30) Coal-bed, South Semboja; (31) Kampong Muara Jawa Lama; (32) Bugis boy, Kampong Muara Jawa Lama; (33) South Dundung; (34) House, South Dundung; (35) View from tree-top, South Dundung; (36) Panorama of Sanga Sanga; (37–49) Sanga Sanga; (50–52) South Sanga Sanga; (53) Kampong, Sanga Sanga; (54 and 55) Jungle track, Sanga Sanga; (56) Survey track, Sanga Sanga; (58) Oil outcrop, Sanga Sanga; (59) Burning surplus oil, Sanga Sanga. **Japan**:—(60–62) Arakawa copper-mine near Akita; (63) Room at inn in Niitsu; (64) Asahi, Niitsu field; (65) Koguchi, Niitsu field; (66) Shiodani, Niitsu field; (67) Kunatsu, Niitsu field; (68 and 69) Refinery at Niitsu; (70) Transporting oil in old kerosene tins, Niitsu field; (71) Hara, Maki field; (72) Bedigo, Maki field; (73) Hand-dug wells, Maki field; (74 and 75) Temple at Tokamachi; (76) Shinano-gawa at Tokamachi; (77) The Zenkoji, Nagano; (78) Shinkoji, near Nagano; (79) View near Nagano; (80) View between Nagano and Naoetsu; (81) Shrine in hotel at Nagaoka; (82) Nagaoka, the refinery centre of the Higashi-yama field; (83 and 84) Ogawa's refinery, Nagaoka; (85 and 86) Kagi, after the earthquake of February, 1906; (87) Refinery, Takato; (88) Myozawa, Nishi-yama field; (89) Solfataras, Nobori-betsu; (90) Hot lake, Nobori-betsu; (91) Katsubozawa, Higashi-yama field; (92) River and one hundred buddhas at Nikko; (93) Ojiya; (94 and 95) Higashi Kubiki; (96) Imbushi; (97) Bedigo, Maki field. **Formosa**:—(98) South

gate of Tainan; (99) East gate of Tainan; (100) West gate of Taipeh; (101) River some miles above Taipeh; (102) Temple at Taipeh; (103 and 104) Bioritsu. **Malacca**:—(105 and 106) Water-spouts in the Straits of Malacca, July, 1908.

China. **Brooke.**

Nine photographs of Western China, taken by the late J. W. Brooke, Esq. 1908. *Presented by the late J. W. Brooke, Esq.*

A melancholy interest is attached to these photographs, inasmuch as they were taken by the late Mr. J. W. Brooke during his attempt to penetrate into the little-known country inhabited by the Lolos and other tribes to the west of Sechuan, on which expedition he finally lost his life. The titles are as follows:—

(1) The Min valley; (2) Kermer river near Ma-t'ang; (3) Coracle on the Kermer river; (4) Tourin of Choso-chia; (5) A Tibetan mastiff; (6) Runga castle; (7) A better-class family of the Mhau tribe; (8) Two headmen of the Mhau tribe.

Hawaii and Fiji Islands.

Thirty-six photographs of Hawaii and the Fiji Islands. *Presented by A. S. Waley, Esq.*

A characteristic set of photographs of scenery and people. The views of craters are specially interesting.

(1) Honolulu; (2) The palace, Honolulu; (3) Prisoners, Honolulu: (4) Half-caste boys, Honolulu; (5) A Hawaiian hotel; (6) Pearl harbour, Oahu; (7–10) Lake of fire; (11) Mauna Loa; (12–14) Lava-fields, Mauna Loa; (16) Approaching Panaluu; (17) Mail coach, Panaluu to volcano; (18) Blow-holes on summit of volcano; (19) Volcano house; (20) Volcano house, sitting-room; (21 and 22) Native hut; (23) Picking cocoa-nuts; (24) Molokai; (25 and 26) Cook's memorial; (27) Diamond head; (28) A Fijian policeman; (29) Fijian girls; (30) Fijian man; (31) Native grass house, Fiji; (32) Fijian clubs; (33) Suva; (34) Street scene, Suva; (35) Suva bay; (36) Custom-house, Suva.

Mexico. **Wallach.**

Fifty-nine photographs of Mexico, taken by H. Wallach, Esq. *Presented by H. Wallach, Esq.*

This set of photographs forms a useful addition to the Society's collection. Antiquities, types of people, vegetation, and other subjects are well selected and essentially typical.

(1–12) Ruins at Mitla; (14) On the road to Mitla; (15) Ruins of Mount St. Alban; (16) Monolet carving of monkey; (17) Monolet carving with hieroglyphics; (18) Entrance to burial-places; (19) Custodian; (20 and 21) General view on approach; (22) Archway, Puebla; (23) Early Spanish irrigation works; (24 and 25) First church built by Cortes at Cholula; (26) Approach to church; (27) Native weaver near Mitla; (28 and 29) Market scene; (30) Wood cutters near Mitla; (31) Ploughing; (32) Gathering pulca; (33) Aged Indian near Javicha; (34) In the fruit market at Orizaba; (35) Fruit-sellers on the railway between Mexico City and Vera Cruz; (36) Near Orizaba; (37–40) In Orizaba; (41–50) Views taken from train between Mexico City and Oaxaca; (53 and 54) Oaxaca; (55) Street in Oaxaca; (56) Church street, Dominigo, Oaxaca; (57) In the market; (58 and 59) In the charcoal market; (60) A charcoal merchant; (61) An ancient cloister in Oaxaca; (62) Native hut.

New Zealand and Tasmania.

Seventy photographs of New Zealand and Tasmania. *Presented by A. S. Waley, Esq.*

These photographs vary in size and quality, but together they form an instructive set. The panorama of the New Zealand Alps, the view of the Waitoara river, and the large general views of Hobart, as well as many others, are worthy of special attention.

(1 and 2) Christchurch; (3 and 4) Dunedin; (5) Panorama of Mount Cook range; (6–9) Mount Sefton; (10 and 11) Mount Sefton from near the Hermitage; (12 and 13) Mounts Cook and Sefton; (14) Mount Cook from Mount Olivier; (15) Scaly range; (16) De la Bêche icefall from Ball hut; (17) The great Tasman glacier; (18) Tasman river from Mount Olivier; (19) Mount Elie de Beaumont from Hooker glacier; (20) The Buller gorge; (21) Near Buller gorge; (22) Rawkawa falls, Mangawhero river; (23) The Hooker river; (24) The Hooker falls; (25) Tongariro volcano, from above the Hooker falls; (26–32) Wanganui river; (33) The caves, Wanganui river; (34) Waitotara river; (35 and 36) The Otira gorge; (37) The Otira gorge: a break-down; (38–40) The Otira gorge: a wash away; (41 and 42) Native types, Ohinemutu; (43) A native chief at Ohinemutu; (44 and 45) The great meeting-house, Ohinemutu; (46) At

Whakarewarewa; (47) Native types at Whakarewarewa; (48) Boy diving at Whakarewarewa; (49) Native girls at Whakarewarewa; (50) Maori boys at Whakarewarewa; (51) At the Devil's Punch Bowl, Whakarewarewa; (52) The great Wairakei geyser; (53) The great obelisk to Maori chief on island in Papai lake; (54) The Great Wahre at Papai lake; (55 and 56) View from Lake Pukaki; (57 and 58) Scouring wool, Kopua; (59) Wool drying at Kopua; (60) Oxen carrying wool at Kopua; (61 and 62) Ruapehu; (63) View on Lake Taupo; (64) Wahre at Taupo; (65) Taupo; (66) On the road; (67 and 68) The great war canoe; (69) Hobart from Lansdowne crescent; (70) Hobart, from Exhibition building.

Peru. **Cipriani.**

Fifteen photographs of the Rio Perené, Peru, taken by Don César Cipriani. *Presented by Cardwell Quinn, Esq.*

The Rio Perené is one of the many rivers flowing from the high mountainous lands of Central Peru down to the Ucayali, which forms one of the headwaters of the Amazon. In addition to illustrating special incidents in the history of the Cipriani expedition, these photographs serve well to show the varied scenery of the country through which the river passes.

(1) Departure of the expedition; (2) The hills on the left bank of the Rio Perené; (3) House, "La Esperanza," and camp of expedition, right bank of Rio Quipanuari; (4) Leaving the balsas and proceeding on foot, Rio Perené; (5) Expedition taking leave of the German colony of the Pozuzo; (6) Cutting a path through the forest; (7) Group of Chunchos at "La Esperanza;" (8) Chunchos preparing fariña; (9) A halt on the march by the playas of the Anchiqui; (10) Camp on a playa in mid-river; (11) Balsas and canoe leaving camp; (12) The foothills of the Andes, Rio Perené; (13) A clearing and two "chozas" of the savages; (14) A pretty bit of the river, Rio Perené; (15) A forest clearing.

Scotland. **Longstaff.**

Six photographs of Scotland, taken by Captain F. V. Longstaff. 1909. *Presented by Captain F. V. Longstaff.*

(1) River Spey at Kingussie, showing floating ice; (2) The Alt Mor at Kingussie; (3) Western Cairn Gorm from Ruthven; (4) Gaick forest, Inverness; (5) Gaick Lodge; (6) View up-stream from Gaick Lodge.

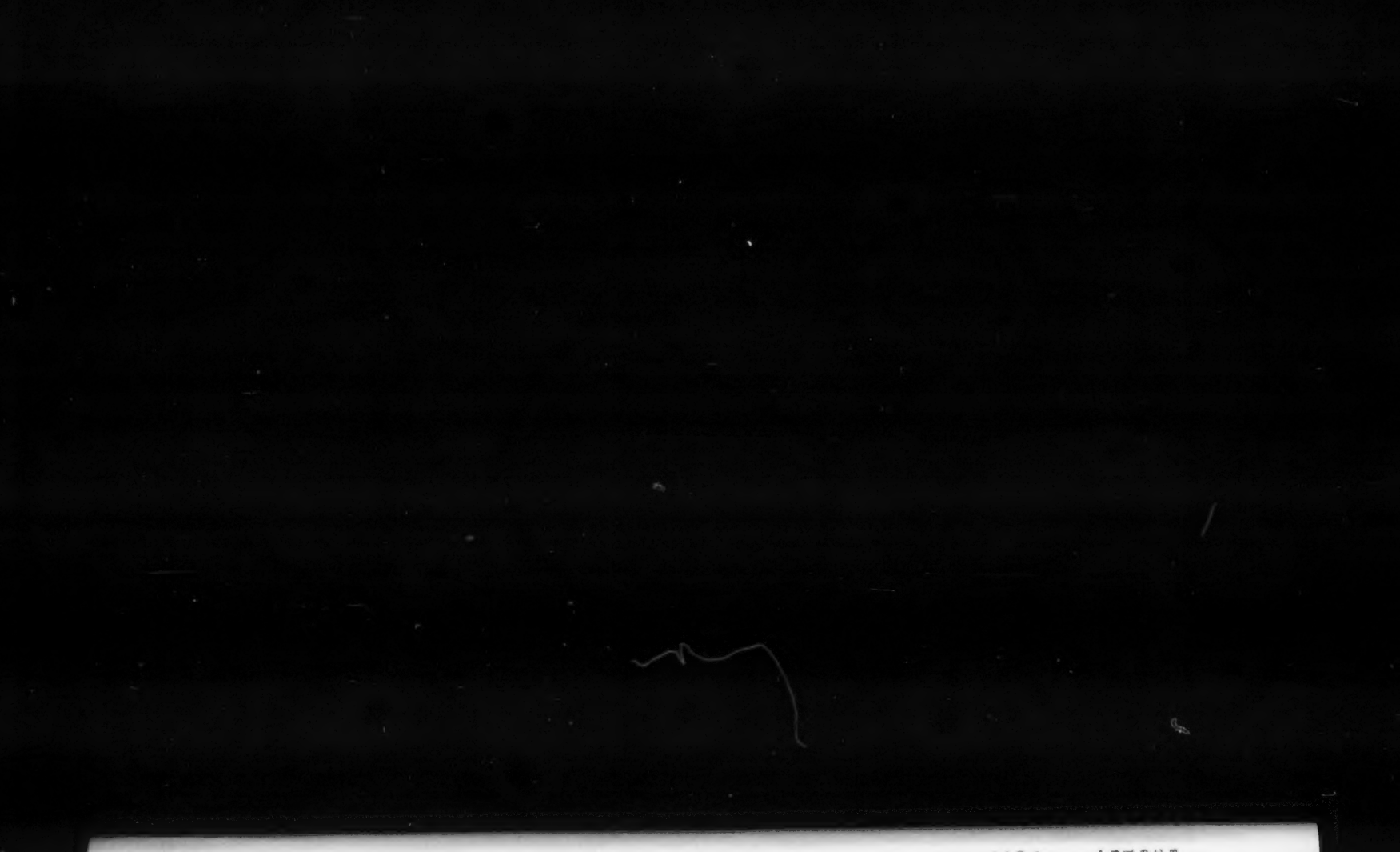
South America. **Alcock.**

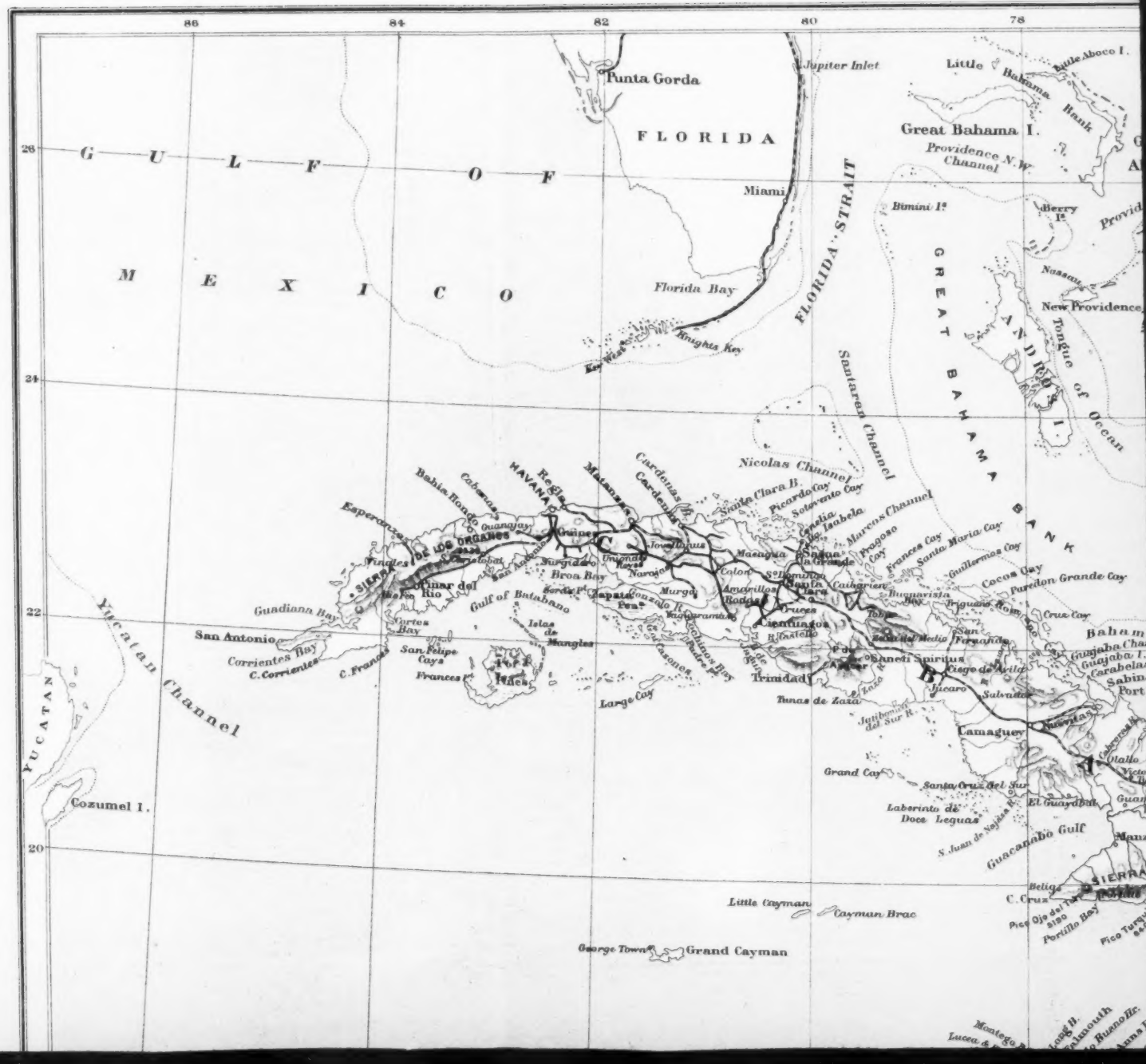
South American scenery. Twenty-four water-colour sketches made on voyages to and from the east and west coasts of South America (reproduced in lithography). By Frederick Alcock, F.R.G.S. With an introduction by Thomas Huson, R.I., R.C.A., R.E. London: Simpkin, Marshall, Hamilton, Kent & Co. *Price 5s. net. Presented by F. Alcock, Esq.*

This little album contains a set of excellent lithographic reproductions of water-colour sketches made by Mr. F. Alcock on voyages to and from the east and west coasts of South America. Owing to the motion of the vessel and climatic conditions, the sketches were not always made under most favourable conditions, but it must be admitted that, if somewhat of the impressionist character, as the author admits is the case, on the whole they convey a good idea of the scenery they are intended to represent, whilst the sea and sky views are specially good. The views are accompanied by text, and introductory text by Thomas Huson, R.I.

(1) Entrance to St. Vincent; (2) Port and town of St. Vincent; (3) Bird Rock lighthouse, St. Vincent; (4) First quarter of the moon, crossing the equator; (5) Island of Fernando Noronha; (6) Entrance to bay of Rio de Janeiro; (7) Rio harbour, early morning; (8) Sugar-loaf, Rio; (9) Tijuca; (10) San Paulo; (11) Opposite the anchorage, Santos; (12) Praia Jose Menino, Santos; (13) Monte Video; (14) Exit from Port Stanley, Falkland islands; (15) Glacier, Mount Wyndham; (16) Glacier bay; (17) Cape Pillar; (18) Volcanoes, Calbuco and Osorno; (19) Old fort corral; (20) View from Vina del Mar hotel, near Valparaiso; (21) View near Los Andes; (22) Inca bridge; (23) Town of Huacho; (24) Casma.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

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Little Bahama Bank
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Miami
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Key West
Knights Key
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Berry Is
Nassau
New Providence
GREAT BAHAMA BANK
Tongue of Ocean
Santaren Channel
Nicolas Channel
Cardenas Bay
Matanzas
HAVANA
Regla
Bahia Honda
Cabanas
Esperanza
Pinar del Rio
Gulf of Batabano
Guadiana Bay
Cortes Bay
San Antonio
Corrientes Bay
C. Corrientes
C. Francis
San Felipe Cays
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Salvador
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Grand Cay
Santa Cruz del Sur
El Guardalvil
Laberinto de Doce Leguas
S. Juan de Nejasa
Guacanayabo Gulf
Manzanillo
Little Cayman
Cayman Brac
George Town
Grand Cayman
Isabela
Marcus Channel
Santa Maria Cay
Guillermos Cay
Cocos Cay
Paredon Grande Cay
Cruz Cay
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Portillo Bay
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Montego B.
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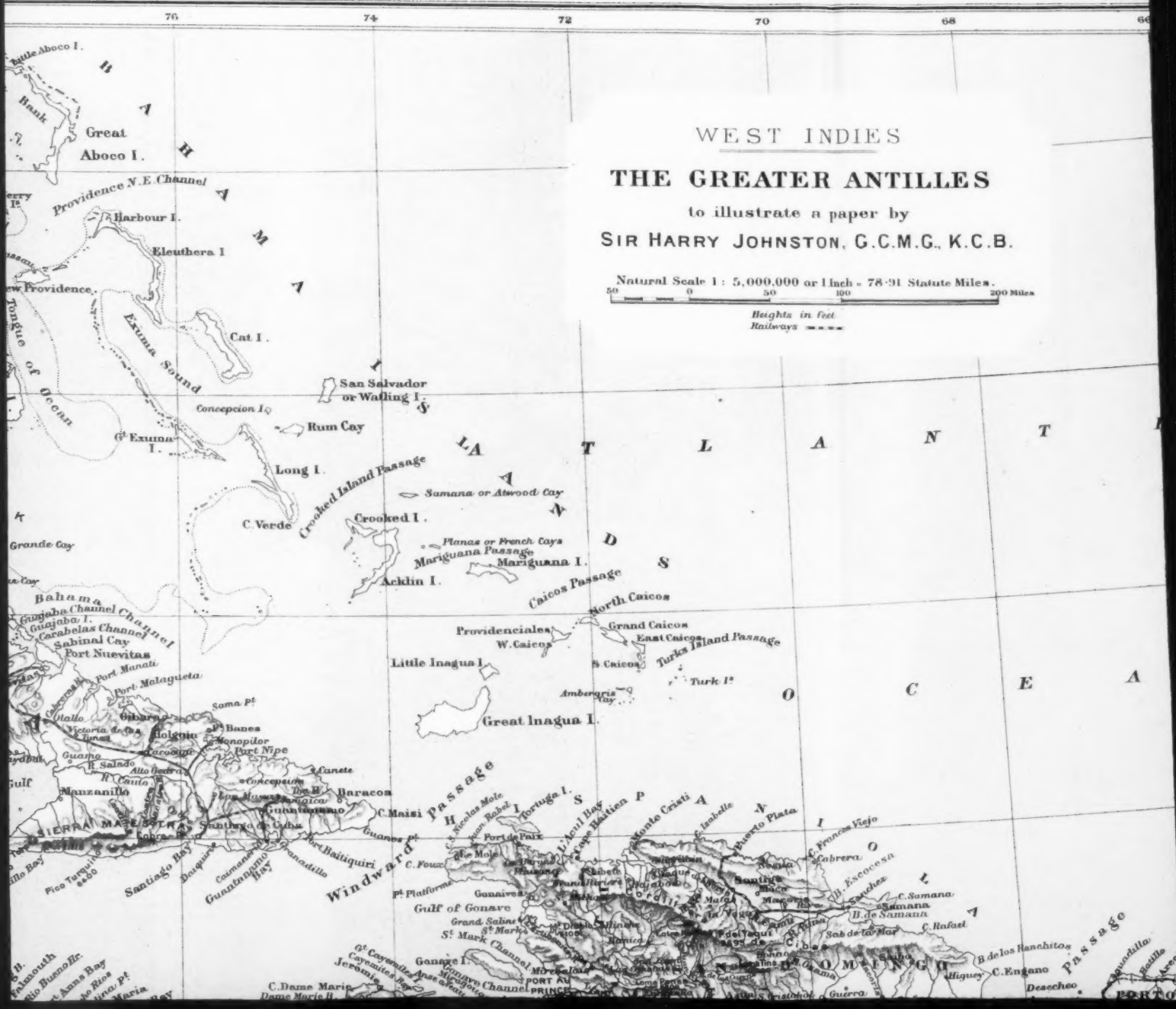
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New Providence
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Exuma Sound
Cat I.
San Salvador or Watling I.
Concepcion I.
Rum Cay
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Long I.
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Grande Cay
Planas or French Cays
Mariguana Passage
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Acklin I.
Caicos Passage
North Caicos
Providenciales
W. Caicos
Grand Caicos
East Caicos
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Guajaba Channel
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Port Manati
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Alto Cedro
R. Cauto
Gulf
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Concepcion
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C. Maisi
Jamaica Channel
Guantanamo
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Santiago de Cuba
Cobre
Pico Turquino 6560
Santiago Bay
Guantanamo Bay
Port Baitiquiri
Windward Passage
Nicolas Mole
Tortuga I.
L'Acul Bay
Cape Haitien
Monte Cristi
Isabella
Puerto Plata
Cabrera
Port de Paix
C. Mole
C. Foux
Pt. Platforme
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Gulf of Gonave
Grand Sabine
St. Marks
St. Mark Channel
Gonave I.
Cayemites Bay
Jeremie
C. Dame Marie
Dame Marie R.
Monte Christi
Santiago
Macoris
La Vega
Cordillera
Samana
C. Samana
B. de Samana
C. Rafael
Sab de la Mar
B. de los Ranchitos
C. Engano
Desecheo
Passage
PORTO
WEST INDIES
THE GREATER ANTILLES
to illustrate a paper by
SIR HARRY JOHNSTON, G.C.M.G., K.C.B.
Natural Scale 1 : 5,000,000 or 1 inch = 78·91 Statute Miles.
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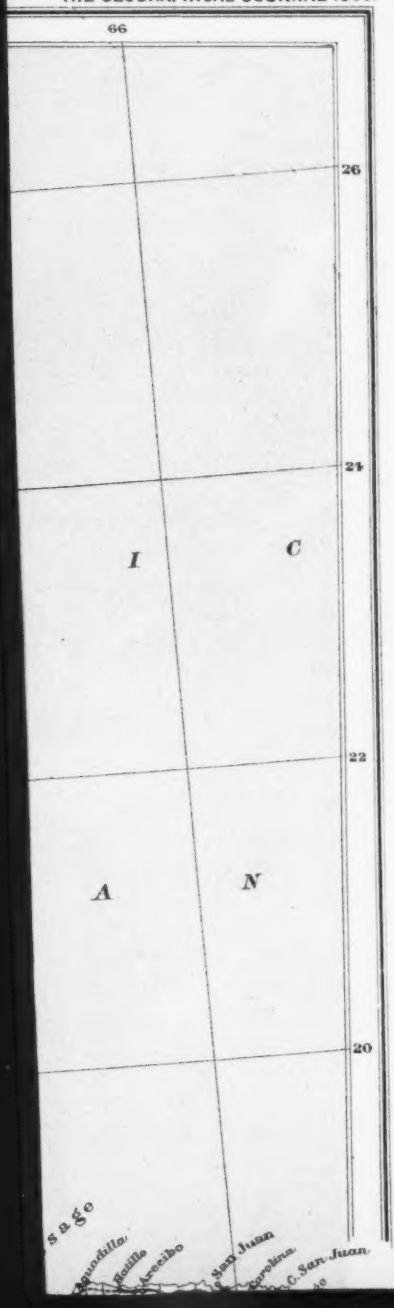
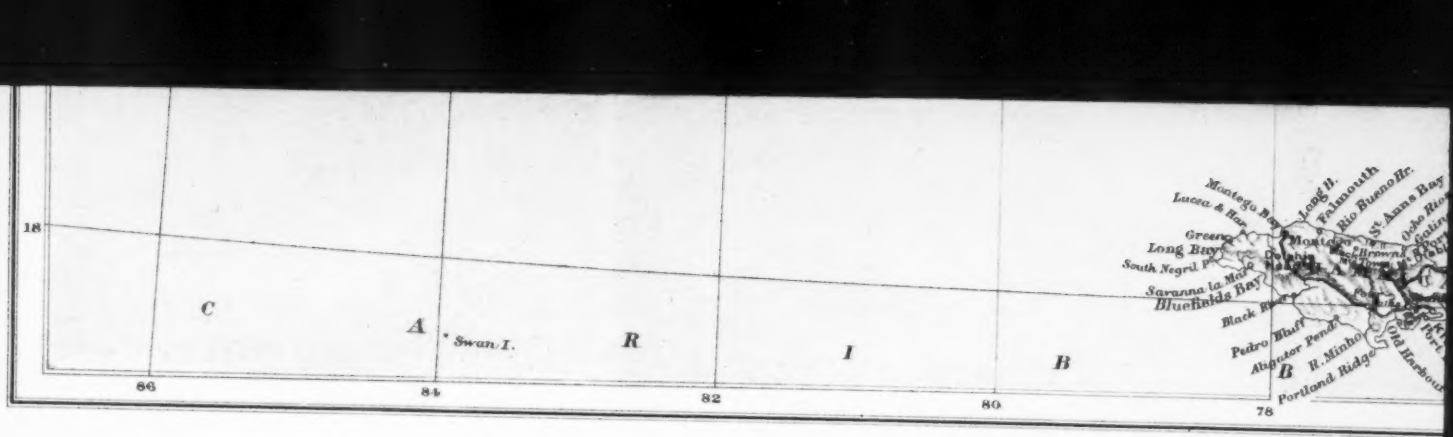
Heights in feet
Railways

THE GREATER ANTILLES.
SIR H. JOHNSTON.

THE GEOGRAPHICAL JOURNAL 1909.

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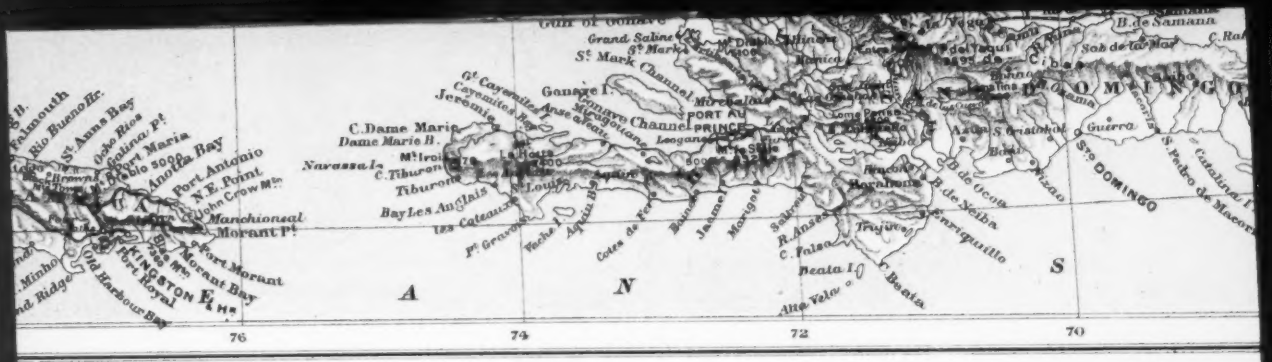
Pedro Bluff
Alligator Pond
R. Minho
Portland Ridge
Old Harbour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C. Dame Maria
Dame Marie B.
Navassa I.
C. Tiburon
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Roundel
Jasmel
Marigot
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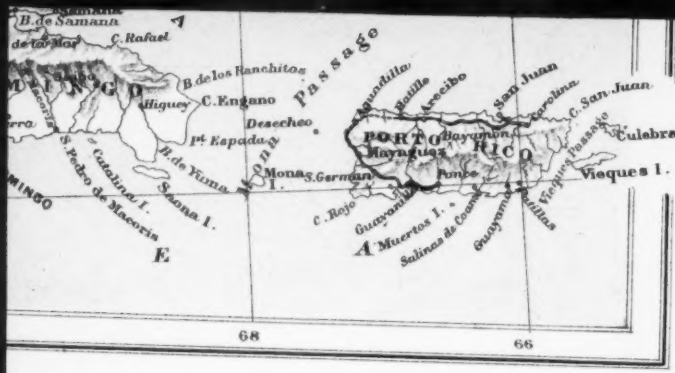
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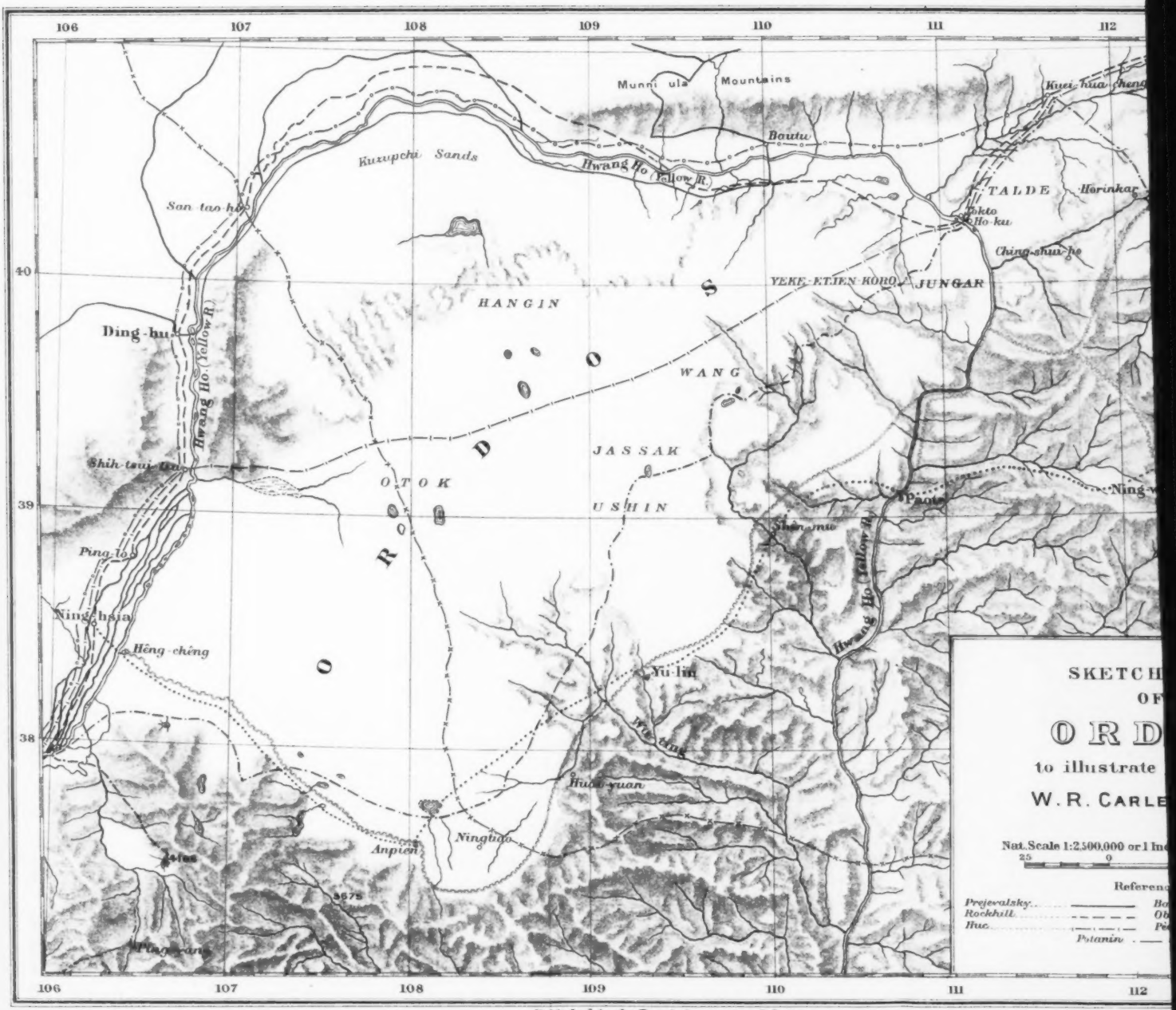
Vieques I.
PORTO RICO
Mayaguez
Ponce
S. Germain
C. Rojo
Guayanilla
Muertos I.
Salinas de Coamo
Guayama
Cabillas
68
66



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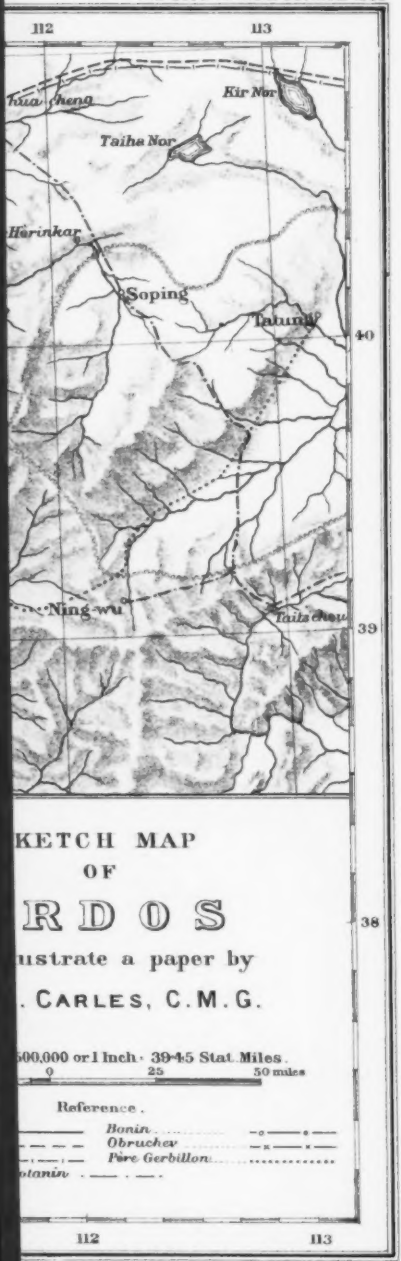

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INDEX.

* Denotes Articles and Papers. † Bibliographical Entry.
§ Reviews and Notices.

A.

Abbot, H. L., Progressive climatic variations on isthmus of Panama, 509 †
Abendanon, E. C., Structural geology of middle Yang-tzĭ-kiang gorges, 614 †
Abruzzi, Duke of the, Ruwenzori: an Account of Expedition of: F. de Filippi, 75 §, 229 †, 721
Abuna river, Bolivia, 181
Abyssinia—
  Hochland von Südäthiopien: F. J. Bieber, 340 †
  Im Auto zu Kaiser Menelik: A. Holtz, 102 †, 323 §
Acre river, Bolivia, 181
Adamović, L., Vegetationsstufen der Balkanländer, 325 §, 339 †
Adams, J. H.: *see* Fraser, C.
Addis Abbaba, Notes on an expedition to: J. I. Craig, 228 †
Admiralty Charts, † 115, 238, 350, 515, 625, 737
Adriatic—
  Climate of Pelagosa Island in the Adriatic: J. Hann, 717
  Scientific Exploration, Austrian, 596
  Tidal Wave, R. von Sterneck's investigations of, 86
Aeronauts—
  Maps for Aeronauts: H. Moedebeck, 218
Afghanistan—
  Among wild tribes of Afghan frontier: T. L. Pennell, 728 †
  Around Afghanistan: B. de Lacoste, 727 †
  Autour de l'Afghanistan: C. H. de B. de Lacoste, 101 †, 613 †
  Relation of Afghanistan to its Neighbours: E. Huntington, 101 †
Afialo, F. G., Sunset playgrounds, 731 †
Africa—
  Afrika-vraagstuk: C. N. Kan, 340 †
  Afrique du Nord: Tunisie, Algérie, Maroc: H. Lorin, 229 †, 708 §
  British Africa, Surveys of (Colonial Reports), 314 §, 346 †
  British East—
    Agreement . . . relative to frontiers between British East Africa, Uganda, and Ethiopia, 507 †
Africa—*continued.*
  British East—*continued.*
    On Safari: big-game hunting in British East Africa: A. Chapman, 228 †, 323 §
    Photographs of: J. Bois, 239 †
    Survey Dept., Annual Report, 1907–08 . . 103 †, 314 §
  British East Africa Company, Formation of, 132
  Circumnavigation Scarabs, Proved forgery of, 214
  Découverte des grandes sources du centre de l'Afrique: E. Lenfant, 228 †, 616 †
  East—
    Alte und neue Handelsstrassen . . . in Ost-Afrika: D. Kürchhoff, 615 †
  East African Problem: Sir H. H. Johnston, 507 †
  French West—
    Afrique Occidentale Francaise. Rapport du Mission Duchesne-Fournet, 616 †
  Geodetic investigations, 574
  Geographie Afrikas bei Plinius und Mela und ihre Quellen: D. Detlefsen, 598 §, 615 †
  German East—
    Ethnographischen Forschungsreise in den Südösten Deutsch-Ostafrikas: K. Weule, 228 †
  German-Portuguese Boundary south of Rovuma, Definition of, 499
  Highways, Some African: C. Kirkland, 228 †, 323 §
  Maps—
    Bathy-Orographical Map of Africa: W. & A. K. Johnston, 624 †
    Carte de l'Afrique Occidentale Française, 736 †
    Karte des Gebiets zwischen Okawango und Sambesi: F. Seiner, 348 †
    Karte von Deutsch-Ostafrika: M. Moisel, 348 †
    Railway Map of South Africa, 237 †
    South Africa: W. & A. K. Johnston, 624 †
  My African Journey: W. S. Churchill, 228 †, 323 §
  Natürlichen Landschaften Afrikas; S. Passarge, 228 †, 329 §

Africa—*continued.*
Pflanzenwelt Afrikas inbesondere seiner tropischen Gebiete: A. Engler, 102 †, 584 §
Pliny's sources for Geography of Africa, 598
Rainfall of North Africa, 697
Safari, On: A. Chapman, 228 †, 323 §
Sandfloh in Africa: D. Kürchhoff, 615 †
South—
Big game in South Africa and its relation to tsetse fly: F. C. Selous, 730 †
Expedition, R. Poch's, 600
Geodetic Survey, Reports: Sir W. G. Morris and H. W. Gordon, 314 §
Guide to South Africa: A. S. and G. G. Brown, 229 †, 323 §
Voyages en Afrique d'Edouard Foà, Resultats scientifiques des, 615 †
West—
Expeditions: B. Alexander's, 90; A. Chevalier's, 329
Sylve équatoriale et les anthropophages: — Cottes, 341 †
Agassiz, A., R.G.S. Medal awarded to, 594, 610
Akhmatof, V., Astronomical and geodetic work with an expedition to Arctic Ocean in 1901..343 †
Alashan range, Ordos, 674
Alaska—
Alaska and Bering Sea Pilot: J. P. Maclear, 104 †
Alaskas Bedeutung für die Gletscherforschung: J. Partsch, 342 †
Boundary, Progress of Demarcation: O. H. Tittmann, 104 †
Fairbanks and Rampart Quadrangles, Yukon-Tanana Region: L. M. Prindle, F. L. Hess, and C. C. Covert, 103 †
Geology and Mineral Resources of Controller Bay Region: G. C. Martin, 229 †
Geschichte nordischer Kolonisation, Ein Beitrag zur: H. Erdmann, 342 †
Gold placers of parts of Seward Peninsula: A. J. Collier and others, 104 †
Haida texts—Masset dialect: J. R. Swanton, 104 †
McKinley Mount, First ascent of: F. A. Cook, 104 †
Mineral Resources of Alaska: A. H. Brooks and others, 104 †
Albert Edward, Lake: *see* Edward, Lake
Albert Nyanza, Discovery of, 125
Albrecht, T., Formeln und Tafeln für geographische Ortsbestimmungen, 232 †
Alcock, F., Water-colour sketches of South American Scenery, 740 †
Alexander, B., Expedition to West Africa, 90
Alföld, Southern, Gradients of gravitational force: L. Eötvös, 325
Algeria—
Etnografiske Iagttagelser fra en Rejse i Algier og Tunis 1908: H. P. Steensby, 311 †
Maps—
Carte des Voies de Communication au Dept. de Constantine (Service des Cartes et Plans), 514 †
Plan de la Ville d'Alger: E. le Bourgeois, 113 †
Morphologische Skizze des Atlas zwischen Philippeville und Biskra: S. Passarge, 341 †
Recherches de L. Gentil dans la région Nédroma-Nemours, Rapport sur, 615 †
Service Géologique des Territoires du Sud de l'Algérie: Compte-Rendu de la Campagne 1907-1908..615 †
Almagià, R., Dottrine geofisiche di Bernardino Telesio, 734 †; Studi Geografici sulle Frane in Italia, 199 §
Alor Star, Malay Peninsula, 484
Alps—
Alpes françaises: F. Briot, 225 †
Campagne géodésique dans les hautes régions des Alpes françaises: P. Helbronner, 100 †
Eiszeitalter, Alpen im: A. Penck und E. Brückner, 611 †
Glaciation quaternaire et actuelle en fonction du socle dans la "Savoie Massive:" P. Girardin, 611 †
Leonardo da Vinci as alpinist, 559, 560
Vegetation, Alpine: H. Schenck, 339 †
Altoguirre y Duvale, A. de, Relaciones geográficas de la Gobernación de Venezuela, 617 †
Alto Paraná river, South America, 2
Amazon—
Botanist on Amazon and Andes, Notes of: R. Spruce and A. R. Wallace, 231 †, 588 §
Navigability of, letter from G. E. Church, 607
Ambrosetti, J. B., Exploraciones arqueológicas en la ciudad prehistórica de "La Paya," 230 †
Amengual, R., Lijeros Apuntes sobre oceanografía, 233 †; Manual de Meteorología práctica, 233 †
America—
British Empire in America: J. Oldmixon, 108 †
Eisenbahnen Amerikas, 616 †
Evolucion del principio de arbitraje en America: F. J. Urrutia, 616 †
Karten von Amerika in dem Islario General des Alonso de Santa Cruz: P. R. von Wieser, 687 §
Recueil de voyages et de documents pour servir à l'histoire de la géographie. De orbe novo: P. M. Anghiera et P. Gaffarel, 730 †
America, Central—
Relaciones históricas y geográficas de América Central, 230 †

America, Central—*continued.*
Richesses de l'Amérique Centrale: D. Pector, 202 §
America, North—
Ancient water-planes and crustal deformation: H. H. Robinson, 731 †
Camp Fires on Desert and Lava: W. T. Hornaday, 323 §
Canyon Voyage: F. S. Dellenbaugh, 714 §
Climatic influences in American history, Some: W. N. Lacy, 508 †
Evolucion del principio de arbitraje en America: F. J. Urrutia, 616 †
Explorations in the North-West, E. de K. Leffingwell's, 215
Geographical comparison between Europe and North America: A. Penck, 604
Journal of travels from Detroit northwest . . . to sources of Mississippi: H. R. Schoolcraft, 109 †
America, South—
Boundaries, International in, 92
Man and Climatic Changes in South America: I. Bowman, 267 *, 602
Maps: Bathy-orographical map of South America: W. & A. K. Johnston, 515 †; Oroscopic Map of South America, 515 †
Other Americans; cities, countries, and especially people of South America: A. Ruhl, 105 †, 210 §
Photographs of South America: W. S. Barclay, 116 †
Pleasure Pilgrim in South America: C. D. Mackellar, 342 †, 593 §
Railways in, 38
Reisestudien aus dem westlichen Südamerika: Therese Prinzessin von Bayern, 231 †
River-basins, great, 37
Travels in Mexico, South America, etc.: G. T. Vigne, 109 †
Water-colour sketches of South American Scenery: F. Alcock, 740 †
American Arctic Expedition, Notes on an Early: H. E. Bryant, 72 *
American Geographers, Association of, Annual Meeting, 221
Amundsen, R., A proposed North Polar Expedition, 440 *; (Biography of): W. Wolkenhauer, 345 †
Anaizeh tribe, Arabia, 520
Andamans—
Local Gazetteer: Andaman and Nicobar Islands, 728 †
Anderson, C. W.: *see* Harrison, J. B.
Andersson, J. G., Geological fragments from Tierra del Fuego, 617 †
Andes—
High Andes of Ecuador, In the: Hans Meyer, 82 §
Notes of a Botanist on Amazon and Andes: R. Spruce and A. R. Wallace, 231 †, 588 §
Andrews, A. W.: *see* Dickinson, B. B.
Anghiera, P. M., et P. Gaffarel, Recueil de voyages et de documents pour servir à l'histoire de la géographie. De orbe novo, 730 †
Angier, A. G., Far East revisited, 102 †, 322 §
Antarctic—
Achievement of Lieut. Shackleton: H. R. Mill, 569 *
Antartida Americana: L. R. Patron, 618 †
Expeditions: J. Charcot's, 94, 217, 604; E. H. Shackleton's, 94, 485
Flore bryologique des Terres magellaniques, etc.: J. Cardot, 232 †
French Expedition: Expédition antarctique française 1903–1905: J. Charcot, 732 †
German Expedition: Deutsche Südpolar-Expedition 1901–1903: E. von Drygalski, 232 †, 618 †
Maps: South Polar Chart, showing approximate route of Lieut. Shackleton's expedition: W. & A. K. Johnston, 625 †
National Antarctic Expedition, 1901–1904. Meteorology. Part I., 188 §
Scottish National Antarctic Expedition: Marine Mollusca of: J. C. Melvill and R. Standen, 106 †; Report on Scientific Results: W. S. Bruce, 618 †
Swedish Expedition: Wissenschaftliche Ergebnisse der schwedischen Südpolar-Expedition 1901–1903: O. Nordenskjöld, 732 †
Anthropogeography—
Géographie sociale; la Mer. Populations Maritimes, etc.: C. Vallaux, 107 †
Homme et la terre: E. Reclus, 734 †
Vorlesungen über Allgemeine Siedlungs- und Verkehrsgeographie, F. v. Richthofen's: O. Schlüter, 234 †
Anthropology—
Empire and anthropology: Sir H. H. Johnston, 107 †
Anti-Cyclones—
Types of Anti-Cyclones in Europe and America: S. Hanzlik, 219
Anticyclonic belt of southern hemisphere: H. E. Rawson, 344 †
Antilles (*see also* West Indies)—
Grands Antilles, étude de géographie économique; D. Bellet, 617 †
Apostolidis, B., Étude sur la topographie du Fayoum, 615 †
Apo-zo lake, Tibet, 313
Arabia—
Baghdad to Damascus *viâ* El Jauf: S. S. Butler, 517 *
Northern, D. Carruthers' Expedition in, 326, 596
South, G. W. Bury's Expedition, 87
Archambault, Fort, Rainy season, 701
Archibald, R. G.: *see* Balfour, A.
Arctic—
American Arctic Expedition, Notes on: H. E. Bryant, 72 *

Arctic—*continued.*
Astronomical and geodetic work with expedition to Arctic ocean in 1904: V. Akhmatof, 343 †
Conquering the Arctic Ice: E. Mikkelsen, 493 §, 618 †
Currents in Polar sea, 446, 447
Expeditions: C. Bénard's, 94
Exploratory work in the, 62, 63
In Search of a Polar Continent, 1905–1907: A. H. Harrison, 106 †
Influence of Siberian rivers on waters of Arctic ocean: D. Pololof, 507 †
North Polar Expedition, Proposed: R. Amundsen, 440 *
Peary Arctic Club, Ten Years of the: H. L. Bridgman, 106 †
People of the Polar North; a record: K. Rasmussen, 106 †
Podosomata of the Arctic Ocean: A. M. Norman, 344 †
Polar Sea, depths of, 442
Revanche de la Banquise: Duc d'Orleans, 708 §, 732 †
Russische Polarfahrt der "Sarja," 1900–1902: Baron und Baronin von Toll, 732 †
Sledge Expedition, Proposed, across North Polar Region: A. H. Harrison, 689 *
Arctowski, H., Histoire des glaciers, 619 †; Problème de l'auto polaire, 618 †; Question des climats de l'époque glaciaire, 619 †; Variations séculaires du climat de Varsovie, 726 †
Argentine—
Alfareriás del noroeste Argentino: F. F. Outes, 617 †
Alfarerías mexicanas en la provincia de Buenos Aires, Sobre el hallazgo: F. F. Outes, 617 †
Arqueología de San Blas: F. F. Outes 617 †
Climatic Changes in, 270
Estudios antropologicos sobré los Chiriguanos, etc.: R. Lehmann-Nitsche, 617 †
Exploraciones arqueológicas en la ciudad prehistórica de "La Paya:" J. B. Ambrosetti, 230 †
Extrañamiento de los Jesuítas del Rio de la Plata y de los Misiones del Paraguay: P. Hernández, 230 †
Guía de Forasteros del Virreinato do Buenos Aires: M. Leguizamón, 617 †
Immigration, 34
Argo, Arctic voyage of the, 72
Arizona—
Coronado's route through Northern Mexico and Arizona: S. Potter, 91
Arka Tagh, Tibet, 67
Arldt, T., Afrikanische Elemente in der neogenen und quartären Fauna von Südwest Europa, 345 †
Armenia—
In the shadow of the crescent: J. A. Campbell, 615 †
Army, British, Recollections of a Life in the: Sir R. Harrison, 324 §
Arnaud, E., et M. Cortier, Nos Confins Sahariens, 582 §
Arnold, C., and others, Wahrhaftige, Beschreibungen dreyer mächtigen Königreiche Japan, Siam, und Corea, 107 †
Arolla, Guide to Walks and Climbs round: W. Larden, 84 §
Artaria's Eisenbahnkarte von Oesterreich-Ungarn, 235 †
Asbinawas people of Sahara, 263
Ascension—
Longitude of Ascension and the Cape, Redetermination of, 723
Ashburton river, New Zealand, 723
Asia—
Central: Eine Reise durch Zentralasien im Jahre 1906: E. Zugmayer, 101 †, 313 §; Sven Hedin's Journey in Central Asia, 1899–1902. Scientific Results: W. Broadfoot, 65
Eastern: Der ferne Osten: C. von Zepelin, 728 †
Far East Revisited: A. G. Angier, 102 †, 322 §
Far East, Wandering Student in the: Earl of Ronaldshay, 226 †, 489 §
Photographs of Eastern Asia, 239 *
Pulse of Asia: E. Huntington, 490 §
Russian expansion towards Asia and the Arctic in Middle Ages: C. R. Beazley, 495 §, 505 †
Semitic magic; its origins and development: R. C. Thompson, 228 †
Southern and Western Asia: A. H. Keane, 613 †, 714 §
Studienreise durch Vorderasien: H. Grothe, 729 †
Travels of R. Bell in East Indies, Persia, and Palestine, 1654–1670: Sir R. C. Temple, 101 †
Vorderasien, Meine Reise durch: H. Grothe, 228 †
Voyage en divers états d'Europe et d'Asie, etc.: P. Avril, 108 †
Western, E. Huntington's Expedition, 87
Asia Minor—
Agriculture in Asia Minor, Report on: W. Dunstan, 212 §, 340 †
Expedition to, E. Huntington's, 87
Grandes routes de l'Asie Mineure, Sur les: J. de Nettancourt-Vaubecourt, 102 †
Maps: Sabandja Sees und Umgebung, 347 †; Reiseroute in West Cilicien: E. Herzfeld, 514 †
Assam—
Bibliotheca Indo-sinica. Ire partie, Birmanie et Assam: H. Cordier, 506 †
Assumption island, Seychelles, 214
Assyria—
Researches in Assyrian and Babylonian geography: O. A. Toffteen, 729 †
Astin Tagh, Tibet, 66

Astoria, or Enterprise beyond Rocky mountains: Washington Irving, 108 †
Astove island, Seychelles, 214
Aswan—
Map: Topographical map of Aswan province (Survey Dept., Cairo), 113 †
Atbara, tributary of Nile, 143
Atlantic ocean—
International Exploration of Atlantic Ocean, On the importance of: O. Pettersson and G. Schott, 68 *
Internationalen Erforschung des Atlantischen Ozeans, Bedeutung einer: G. Schott, 344 †
Maps: Monthly Meteorological Charts of North Atlantic and Mediterranean (Met. Office, London), † 116, 239, 350, 516, 626, 738; Pilot Chart of North Atlantic Ocean (U.S. Hydrog. Office), † 116, 239, 350, 626, 738
Podosomata of the temperate Atlantic: A. M. Norman, 344 †
Seezeichen, Leuchtfeuer und Schallsignale des Atlantischen Ozeans: A. Hiebel, 345 §
Atlas mountains—
Morphologische Skizze des Atlas zwischen Philippeville und Biskra: S. Passarge, 341 †
Snow-covering of Western Atlas: P. Lemoine, 498
Atlases—
Atlas général Vidal-Lablache, 115 †, 238 †, 349 †, 515 †
Atlas Universel de Géographie: V. de St. Martin et F. Schrader, 115 †
British Empire (and Japan): W. Bisiker, 349 †
Class-room Atlas of physical . . . geography: E. F. Elton, 114 †
"Diagram" Hand Atlas: B. B. Dickinson and A. W. Andrews, 625 †
Edinburgh School Atlas: W. & A. K. Johnston, 349 †
Formæ Orbis Antiqui: R. Kiepert, 114 †
Geographical Statistical Universal Pocket Atlas: A. L. Hickman, 238 †
Geschichte der Kartographie der Japanischen Inseln: Paul Graf Teleki, 736 †
Atmosphere [Meteorology]—
Atmosphere, The: E. J. Houston, 233 †, 593 §
Attinger, V.: *see* Knapp, C.
Aubin, E., Perse d'aujourdhui, 227 †, 322 §
Auerbach, B., Canalization of the Moselle and Sarre, 211
Australia—
Australian Weather: D. J. Mares, 105 †
Australie pastorale: P. Privat-Deschanel, 617 †
Origin of Australia: S. B. J. Skertchly, 617 †
South: Eingeborenen der Kolonie Südaustralien: E. Eylmann, 106 †
Western: Geological Features and Mineral Resources of Pilbara Goldfield: A. G. Maitland, 618 †
Australia—*continued.*
Austria—
Allgemeine Bericht und Chronik der im Jahre 1906 in Oesterreich beobachteten Erdbeben, 726 †
Flachgräber der Hallstattzeit bei Statzendorf in Niederösterreich: A. Dungel, 99 †
Hydrographie des istrischen Karstes: G. A. Perks, 339 †
Klimatographie des Oesterreichischen Küstenlandes: E. Mazelle, 611 †
Maps: Ausflugskarte: G. Freytag, 621 †, 735 †; Evangelischen Kirche Augsburgischen und Helvetischen Bekenntnisses in Oesterreich, 621 †; Landes Voralberg: G. Freytag, 621 †; Politischen Bezirkes Hiet-zing-Umgebung, 621 †
Morphologische Bemerkungen zur Dammrutschung bei Ardning: G. Götzinger, 611 †
Müller und die Vaterländische Kartographie: K. Peucker, 339 †
Oberflächenformen des Dinarischen Gebirges: A. Grund, 611 †
Prazisionsnivellements, Fortsetzung des, 339 †
Austria-Hungary—
Maps: Artaria's Eisenbahnkarte von Oesterreich-Ungarn, 235 †; Dislokationskarte des k. u. k. österr.-ung. Heeres, der Landwehren und der Gendarmerie Korps, 1908..109 †; Grenzgebiete Oesterreich-Ungarns und Serbiens: G. Freytag, 622 †; Königreiche Ungarn und Galizien und des Herzogtums Bukowina: J. G. Rothaug, 511 †; Politische Karte der Oesterreichisch-Ungarischen Monarchie nebst angrenzenden Gebieten: J. G. Rothaug, 622 †; Verkehrs-Karte von Oesterreich-Ungarn: G. Freytag, 511 †
Austrian Scientific Exploration of Adriatic, 596
Avebury, Lord, Scenery of Switzerland, 727 †
Avril, P., Voyage en divers états d'Europe et d'Asie, etc., 108 †
Axholme—
Rivers of Axholme, with history of navigable rivers and canals of district: G. Dunston, 727 †

B.

Babelon, E., R. Cagnat, and S. Reinach, Atlas Archéologique de la Tunisie, 624 †
Baccari, E., Il Congo, 228 †
Baddeley, J. F., Russian Conquest of the Caucasus, 615 †
Baedeker, K., Central Italy and Rome,

726 †; Greece. Handbooks for travellers, 225 †, 321 §
Baer, K. E. von, Services to the cause of Geography: A. Heydenreich, 724
Baganda at Home: C. W. Hattersley, 210 §, 341 †
Baghdad—
Baghdad to Damascus *viâ* El Jauf, North Arabia: S. S. Butler, 517 *
Desert ways to Baghdad: L. Jebb, 102 †, 322 §
Railway: E. Pears, 507 †
Short cut to India: Record of Journey along Route of Baghdad Railway: D. Fraser, 707 §, 729 †
Bahr-el-Gebel, marshes and "sudd" blocks, 138
Bahr-el-Zaraf, Nile tributary, 142
Bailey, E. B.: *see* Kendall, P. F.
Baker, J., Literary and biographical studies, 235 †
Baker, Sir S., discoveries in Nile regions, 125
Bakhuyzen, H. G. van de S., Comptes rendus des séances de la Quinzième Conférence Générale de l'Association Géodésique Internationale, 232 †
Balaton lake, scientific exploration, 325
Balen, C. L. van, De wind als geologische factor in het Gooi, 225 †
Balfour, A., Third Report of Wellcome Research Laboratories at Gordon Memorial College Khartoum, 616 †; and R. G. Archibald, Review of some of recent advances in tropical medicine, hygiene, etc., 620 †
Balkan Peninsula—
British Officer in the Balkans: P. E. Henderson, 592 §, 611 †
Eiszeit auf der Balkanhalbinsel, etc.: J. Cvijić, 505 †
Geographie und Geologie von Mazedonien und Altserbien, etc.: J. Cvijić, 99 †
Maps: Near Eastern Question: W. & A. K. Johnston, 235 †; Südost-Europäischen Halbinsel: H. Kiepert, 109 †;
Vegetationsstufen der Balkanländer: L. Adamović, 325 §, 339 †
Ball, J., Desert water supplies, 507 †
Baltic—
Gestalt der deutschen Ostseeküste: W. Bartels, 225 †, 716 §
Maps: Philips' Timber and Mercantile Map of Baltic, 110 †
Oceanographical observations, 70
Banse, E., Fünf Landschaftstypen aus dem Orient, 507 †
Baratta, M., Nuova carta del Vesuvio dell' Instituto Geografico Militare, 505 †
Barbour, T., Further Notes on Dutch New Guinea, 105 †
Barclay, W. S., Photographs of South America, 116 †: River Paraná: an Economic Survey, 1*
Bari grammar and vocabulary: R. C. Owen, 103 †
Baringo, Lake, discovery of, 129
Barrell, J., Relations between climate and terrestrial deposits, 619 †
Barron, T., Topography and geology of district between Cairo and Suez, 103 †
Barrow, G. (*see also* Harker, A.), High-level platforms of Bodmin Moor, 506 †
Bartels, W., Gestalt der deutschen Ostseeküste, 225 †, 716 §
Bartholomew, J., Contoured Road-map of Scotland, 623 †; Contour Motoring Map of Central Europe, 513 †; Plan of Birmingham, 622 †
Base-measurement—
Account of measurement of a base on Hounslow Heath: W. Roy, 108 †
Mesure rapide des bases géodésiques: J. R. Benoit et C. E. Guillaume, 106 †
Bavaria—
Oberbayerischen Seen; A. Edelmann, 612 †
Südbayrische Landschaft einst und jetzt in orographischer . . . Hinsicht: G. Breu, 504 †
Beaufort sea, Exploration of, 494
Beaumont, Sir L., remarks on: "A proposed North Polar Expedition," 459; "Danish North-East Greenland Expedition," 62; "Proposed Sledge Expedition across North Polar Region," 692
Beazley, C. R., Russian expansion towards Asia and Arctic in Middle Ages, 495 §, 505 †
Bechuanaland—
Photographs of: A. W. Hodson, 351 †
Beckett, H. W., Notes on underground water of Egypt, 103 †
Bedawin: *see* Bedouin
Beddoe, J., Last Contribution to Scottish Ethnology, 506 †
Bedouin—
Beduin tribe, Arabia, 519, 521
Witness of the Wilderness: G. R. Lees, 592 §, 615 †
Beeby, W. T., and E. Reynolds-Ball, Levantine Riviera, 225 †, 321 §
Beech, M. W. H., Tidong dialects of Borneo, 227 †
Behaim—
Martin Behaim: his life and his globe, E. G. Ravenstein, 231 †, 679 §
Belam, H., Chart of Liverpool Bay, 516 †
Belaunde, V. A., Cuestión de límites Peruano-Boliviana ante el Arbitro Argentino, 342 †
Belgium—
Maps: Carte de Belgique (Institut Cartographique Militaire), 346 †, 511 †
Novum ac magnum Theatrum Urbium Belgicæ Regiæ: J. Blaeu, 108 †
Bell, Richard, Travels of, in East Indies, etc., 1654–1670: Sir R. C. Temple, 101 †

Bell, Robert, Sir W. E. Logan and Geological Survey of Canada, 511 †
Bellet, D., Grandes Antilles; étude de géographie économique, 617 †, 714 §
Beltrán y Rózpide, R., El ideal geográfico y los progresos de la geografía, 621 †
Bénard, C., Expedition to Novaya Zemlya, 94
Bengal—
Trade between Eastern Bengal and Assam and adjoining foreign tribes and countries, Report on: S. G. Hart, 102 †
Vervarelyke Schip-Breuk van't Oost-Indisch Jach ter Schelling onder het Lande van Bengale etc.: F. H. Van der Heiden, 109 †
Benoit, J. R., and C. E. Guillaume, Mesure rapide des bases géodésiques, 106 †
Berbers of Sahara, 260
Berg, L., Journey to glaciers of Upper Isfara, 101 †
Bering Sea—
Alaska and Bering Sea Pilot: J. P. Maclear, 104 †
Bermudas—
Guide to West Indies and Bermudas: F. A. Ober, 231 †, 593 §
Bernacchi, L., remarks on: "Danish North-East Greenland Expedition," 64; "Panama Canal in 1908," 179
Bernard, A., and N. Lacroix, Pénétration Saharienne, 79 §
Berry—
Berry, Le, contribution à l'étude géographique d'une région française: A. Vacher, 225 †
Bidlingmaier, F., Schwingungsbeobachtungen mit der Horizontalnadel auf See, 343 †
Bieber, F. J., Hochland von Südäthiopien, 340 †
Bille, T. de, remarks on "Danish North-East Greenland Expedition," 61
Bir Alali, rainy season, 701
Birger, S., Om Härjedalens Vegetation, 505 †
Bir Hajaj—
Reconnaissance de la région de Bir Hadjaj: de Saint-Léger, 341 †
Birmingham—
Maps: Plan of Birmingham: J. Bartholomew, 622 †
Birot, J., Statistique annuelle de géographie comparé, 345 †
Bisiker, W., British Empire (and Japan): A modern atlas, 349 †
Bismarck archipelago—
Expedition under Drs. Sapper and Friederici, 333
Black, C. E. D., Trade and resources of Tibet, 101 †
Blackman, L. G., The Pacific: the Most Explored and least known Region of the Globe, 232 †
Blaeu, J., Novum ac magnum Theatrum Urbium Belgicæ Regiæ, 108 †
Blanc, Mont—
Visibilité du Mont Blanc à longue distance, Sur un cas rare de: P. Girardin, 100 †
Blassneck, M. F., Neuseeland nach seiner Geschichte und seiner Natur, 618 †
Blazquez, A., y D. Aguilera, San Isidoro de Sevilla's Mapa Mundi, 734 †
Blundell, H. W., remarks on "Journey from Tripoli across Sahara to Lake Chad," 265
Bodmin Moor, High-level platforms of: G. Barrow, 506 †
Bogdo-Ola Valley and Lake, Tian-Shan, 284
Bogoslof—
Evolution of Bogoslof Volcano: T. A. Jaggar, 104 †
Bohemia—
Geomorphologische Studien . . . aus dem südlichen Böhmerwalde: A. Sellner, 339 †
Böhm, A. von, Appointment to Geographical Chair at Czernowitz University, 605
Bois, J., Photographs of British East Africa, 239 †
Bolivia—
Bolivie, La: W. van Brabant, 731 †
Cuestión fronteriza con el Paraguay: B. Saavedra, 104 †
Frontier between Bolivia and Brazil, Survey Work on the: P. H. Fawcett, 181 *
Mission scientifique G. de Créqui Montfort et E. Sénéchal de la Grange. Anthropologie bolivienne: A. Chervin, 731 †
Railway Company, Bolivian, Informe del Inspector Fiscal de los Ferrocarriles de, 104 †
Bolshezemelsk Tundra and the Arctic Ocean: A. Novosiltzof, 505 †
Bonacina, L. C. W., remarks on "Isohyets 'twixt Sahara and Western Sudan," 705
Bongba province, Tibet, 391
Bordeaux, —, Deux contre-rezzous dans l'Ouaddaï, l'Enndi et le Borkou, 730 †; Journeys East and North of Lake Chad, 498; Work in French Sahara, 90
Borel, M.: *see* Knapp, C.
Borne, G. von dem: *see* Von dem Borne
Borneo—
Geologischen Streifzug in Central Borneo, Vorläufiger Bericht über einen: H. Hirschi, 227 †
Photographs of Dutch Borneo, Japan, etc.: F. R. H. Garrett, 738 †
Tidong dialects of Borneo: M. W. H. Beech, 227 †
Bosnia—
Through Bosnia and Hercegovina with a Paint Brush: E. R. Whitwell, 713 §, 726 †
Bosworth, G. F., Cambridge County Geographies. Essex, 727 †; Ditto. Kent, Sussex, and Surrey, 727 †

Bourgeois, E. le, Plan de la Ville d'Alger, 113 †
Bovill, W. B. F., Hungary and the Hungarians, 101 †
Bowman, I., Man and Climatic Change in South America, 267 *, 602
Brabant, W. van, La Bolivie, 731 †
Bradley, A. G., Making of Canada, 229 †, 592 §
Bradshaw, A. F., Catharine Grace Loch. A Memoir, 234 †
Brahmaputra, Sources of, 402, 409, 420
Branford, V., remarks on "River Paraná: an Economic Survey," 38
Brazil—
Aspectos da natureza do Brazil: E. A. Goeldi, 104 †
Boundaries of, 92
Colonization in, 32
Frontier between Bolivia and Brazil, Survey Work on: P. H. Fawcett, 181 *
Railroads of, 27
Southern campos of Brazil: R. de C. Ward, 617 †
Trade of consular district of Pará, Report for 1907, 104 †
Zwei Jahre unter den Indianern: Reisen in Nordwest-Brasilien, 1903-1905: T. Koch-Grünberg, 105 †
Breed, C. B., and G. L. Hosmer, Principles and practice of surveying, 733 †
Brennecke, W., Tiefsee- und Hochluft-Forschungen an Bord S.M.S. *Planet*, 344 †
Breu, G., Südbayrische Landschaft einst und jetzt in orographischer . . . Hinsicht, 504 †
Bridgman, H. L., Ten Years of Peary Arctic Club, 106 †
Briot, F., Alpes françaises, 225 †
British Colonies—
Statistical Abstract for the several British Colonies, Possessions, and Protectorates, 1893-1907..346 †
Surveys of British Africa, Ceylon, and Federated Malay States, 314 §, 346 †
British Columbia—
Colombie britannique: A. Métin, 201 §, 616 †
Triangulation survey, 331
British Empire—
British Empire in America: J. Oldmixon, 108 †
Geographical Conditions affecting the British Empire. I. British Islands: H. J. Mackinder, 462 *
Maps: British Empire (and Japan): a modern atlas: W. Bisiker, 349 †
Our Empire Story: H. E. Marshall, 107 †, 324 §
Outposts of Empire: J. Lang, 324 §
British Isles: *see* United Kingdom.
Brives, A., Les Beni-Snassen (Maroc), 341 †
Broadfoot, W., Sven Hedin's Journey in Central Asia, 1899-1902: Scientific Results, 65
Brockmann-Jerosch, H., and A. Heim, Vegetationsbilder von Nordrand der algerischen Sahara, 341 †
Brooke, G. E., Essentials of sanitary science, 235 †
Brooke, J. W., Murder by Lolos, 597; obituary, 222; Photographs of Western China, 739 †; Through China to Tibet in 1906..614 †
Brooks, A. H., and others, Mineral Resources of Alaska, 104 †
Brown, A. S., and G. G., Guide to South Africa, 229 †, 323 §
Brown, F., Religion in Tientsin, 226 †
Brown, George, pioneer missionary and explorer: an autobiography, 620 †, 715 §
Bruce, W. S., Scottish National Antarctic Expedition. Report on Scientific Results, 618 †
Brückner, E.: *see* Penck, A.
Brulé, Etienne (Biography): B. Suite, 345 †
Brun, A., Quelques Recherches sur le Volcanisme, 310 §
Bruun, Malthe Conrad (Biography): R. Frenzel, 620 †
Bryant, H. E., Notes on an Early American Arctic Expedition, 72 *
Buchanan, J. Y., Ice and its natural history, 344 †
Buenos Aires—
Arqueologia de San Blas: F. F. Outes, 617 †
Forasteros del Virreinato do Buenos Aires (1803), Guia de: M. Leguizamón, 617 †
Sobre el hallazgo de alfarerías mexicanas en la provincia de Buenos Aires: F. F. Outes, 617 †
Bukedi district, Uganda Protectorate, 194
Bumiro district, Uganda Protectorate, 195
Burgklehner, Mathias, Map of Tyrol, 568
Burma—
Bibliotheca Indo-Sinica. I^re^ partie: Birmanie et Assam: H. Cordier, 506 †
Photographs of: A. S. Waley, 627 †
Burnaby, F., Life of: T. Wright, 345 †, 593 §
Burpee, L. J., Search for the Western Sea, 316 §; York factory to the Blackfeet: the Journal of A. Hendry, 229 †
Burton, R., Early discoveries in Nile Region, 120
Buru—
Noordoost kust van Boeroe, Een tocht langs de: J. H. van der Miesen, 227 †
Bury, G. W., Expedition in South Arabia, 87
Bute—
Glacial phenomena in Bute: W. J. Millar, 506 †
Butter, S. S., Baghdad to Damascus *viâ* El Jauf, N. Arabia, 517 *
Buvuma Island, Victoria Nyanza, 192

C.

Cabeza de Vaca, A. N., Relación de los naufragios y Comentarios de, 234 †

Calabria—
Earthquakes and Geological structure: M. Crignoux, 716
Marine phenomena during Calabrian earthquake of 1905: G. Platania, 505 †
Questioni topografiche e topologiche sull estrema Calabria: G. Grasso, 613 †

Calcutta—
Atmosphere above Calcutta, Note on, calm region in: C. Little, 614 †

California—
Coast of California, Sir Francis Drake's voyage on: G. Davidson, 216
Sunset playgrounds; fishing days and others in California and Canada: F. G. Aflalo, 731 †

Calkins, F. C.: *see* Ransome, F. L.

Calvert, A. F., Valladolid, Oviedo, etc., 84 §

Camagüey, Cuba, 641

Cambodia—
Geologie du Cambodge et du Bas-Laos: R. de Lamothe, 614 †

Cambridge—
Cartography of Cambridgeshire, Nineteenth Century: H. G. Fordham, 226 †

Camden, W., Britannia; sive florentissimorum regnorum Angliæ, Scotiæ Hiberniæ, et insularum adiacentium, 108 †

Camp Fires on Desert and Lava: W. T. Hornaday, 323 §

Campbell, J. A., In the shadow of the Crescent, 615 †

Camps et enceintes: A. Guébhard, 345 †

Canada—
Boundaries between Canada and New Brunswick, Papers relative to settlement of (1851), 109 †
Bourgeois de la Compagnie du Nord-Ouest: L. R. Masson, 108 †
Canada et Canadiens: A. Loir, 104 †, 323 §
Canada's Fertile North Land: E. J. Chambers, 200 §
Côte nord du Saint-Laurent et le Labrador Canadien: E. Rouillard, 229 †
Department of Interior, Annual Report, 1906–07..342 †
Georgian Bay Ship Canal, Interim Report, 602 §, 616 †
Glaciers, Canadian, Nature and activity of: W. H. Sherzer, 731 †
History of Canada, 1763–1812: Sir C. P. Lucas, 730 †
Making of Canada: A. G. Bradley, 229 †, 592 §
Maps: Canada, showing minerals (Geol. Survey, Ottawa), 113 †; Nova Scotia (Geol. Survey, Ottawa), 113 †; Sectional map of Canada (Dept. of Interior, Ottawa), 237 †, 349 †, 514 †, 624 †, 736 †; Standard Topographical Map (Dept. of Interior), 585 §; Topographic map of Canada (Dept. of Militia and Defence, Ottawa), 237 †, 585 §
Minerals and Ores of Northern Canada: J. B. Tyrrell, 508 †
Mountain forms in Canadian Rockies, Causes of: A. P. Coleman, 731 †
Oil-fields of Eastern Canada: R. W. Ells, 730 †
Sunset playgrounds; fishing days and others in California and Canada: F. G. Aflalo, 731 †
Survey of, 1 inch to 1 mile, 577
Topographical Surveys, Annual Report for 1906–07..330 §, 508 †
Travels and adventures in Canada and Indian Territories in 1760–1776: A. Henry, 108 †
Western Sea, Search for the: L. J. Burpee, 316 §
York factory to the Blackfeet. Journal of A. Hendry, 1754–55: L. J. Burpee, 229 †

Canal—
Artificial waterways and commercial development: A. B. Hepburn, 734 †

Canary islands—
Iles canaries: déscription de l'archipel: L. Proust et J. Pitard, 729 †

Canerio, Nicolo de, Marine World Chart of: E. L. Stevenson, 683 §

Cannon, R., and A. C. Murray, Map of Orange River Colony, 113 †

Canterbury, New Zealand, Terrace-development in Valleys of: R. Speight, 721 §

Cape Colony—
Cape of Good Hope. Report on Rietfontein area: J. F. Herbst, 507 †
Geological Commission, Twelfth Annual Report of, 103 †
Longitude of Ascension and the Cape, Redetermination of, 723
Maps: Geological Map of Colony of Cape of Good Hope (Cape Geol. Comm.), 736 †

Cardot, J., Flore bryologique des Terres magellaniques, etc., 232 †

Carles, W. R., Problems of Exploration: II. Ordos, 668 *

Carne, J. E., Geology and Mineral resources of Western Coalfield, New South Wales, 105 †

Caroline islands—
Studienreise nach den Zentral- und Westkarolinen: A. Krämer, 217 §, 343 †

Carpathians—
Pflanzenverbreitung in den Karpathen, Grundzüge der: F. Pax, 224 †

Carruthers, D., Expedition to Northern Arabia, 326, 596

Cartographical Documents of Age of Great Discoveries: E. Heawood, 679 *

Cartography—
Geologie und Kartographie in ihrer gegenseitigen Beziehung bei der Terraindarstellung in Karten: G. von Dittrich, 343 †
Improvement in, 576
Origines de la Cartographie portuguaise et les cartes des Reinel: J. Denucé, 686 §
Projektion für Karten grossen und mittlern massstabs, Zur Wahl der: J. Frischauf, 343 †
Storia della cartografia seguiti dal periplo dell' Italia desunto de 11 mappe: M. Longhena, 620 †
Theorie und Geschichte des Kartenbildes: Neue Bemerkungen zur: K. Peucker, 232 †
Casabona, L., São Paulo do Brésil, 230 †
Castelnau, P., Sur les traces d'un mouvement positif le long des côtes occidentales de Corse, 612 †
Catalogue—
Catalogo dos manuscriptos da Bibliotheca Publica Eborense: J. H. da Cunha Rivara, 108 †
Foreign Office, Catalogue of printed books in Library of, 346 †
Caucasus—
Côte d'azur russe (Riviera du Caucase): E.-A. Martel, 227 †
Maps: Gebirgskarte von Kaukasien aus Stieler's Handatlas, 514 †
Namen der kaukasischen Völker, Die heutigen: A. Dirr, 507 †
Russian Conquest of the Caucasus: J. F. Baddeley, 615 †
Cauvet, G., Sables du Sahara Algérien, 341 †
Cayley, G. J., Bridle Roads of Spain, 321 §
Cecchi, A., Da Zeila alle frontiere del Caffa, 108 †
Celebes—
Berglandschappen Napoe en Bessa in Midden-Celebes, 728 †
Ceylon—
Forschungsreise nach Ceylon und die Steinzeit der Weddas: F. Sarasin, 340 †
Maps: Agricultural Map of Northern Province, Ceylon, 237 †; Town of Nuwara Eliya, 736 †
Naturwissenschaftlicher Forschungen auf Ceylon: P. und F. Sarasin, 101 †
Survey Dept., Ceylon. Report: P. D. Warren, 614 †
Chad, Lake—
Étude sur le Tchad et le Bassin du Chari: H. Freydenberg, 584 §
Journey from Tripoli across Sahara to Lake Chad: H. Vischer, 241 *
Journeys East and North of Lake Chad by Commandant Bordeaux, 498
Rainfall of Lake area, 701
Chagres river, Panama, 155
Chaillé-Long, C., Work in the Sudan, 90
Chaix-Dubois, E., Quelques documents nouveau sur les glaciers, 233 †
Chamberlin, T. C., Soil wastage, 345 †
Chambers, E. J., Canada's Fertile North Land, 200 †
Chaouia, Les: F. Weisgerber, 508 †
Chapman, A., On Safari; big-game hunting in British East Africa, 228 †, 323 §
Chapman, J. M., Corsica, 84 §
Charcot, J., Antarctic Expedition, 94, 604; Expédition antarctique française (1903–1905), Journal de l'expédition, 732 †
Charles III., A relation of three Embassies from, to Great Duke of Muscovie, etc.: G. Miege, 108 †
Charta-tsangpo, Tibet, 414
Charts—
Admiralty, † 115, 238, 350, 515, 625, 737
Danish Hydrographic, 350 †
Liverpool Bay: H. Belam, 516 †
Meteorological Charts of Indian Ocean and Red Sea (Met. Office, London), † 116, 239, 350, 516, 626, 738; North Atlantic and Mediterranean (Met. Office, London), † 116, 239, 350, 516, 626, 738
Morocco. Hydrographic Charts (Mission Hydrographique au Maroc), 350 †
Nautical Charts: G. R. Putnam, 232 †
Norway. Kystkarter (Norges Geografiske Opmaaling), 626 †
Pilot Charts of North Atlantic (U.S. Hydrog. Office), † 116, 239, 350, 626, 738; North Pacific (U.S. Hydrog. Office), † 116, 239, 350, 516, 626, 738
Chervin, A., Mission scientifique G. de Créqui Montfort et E. Sénéchal de la Grange, Anthropologie bolivienne, 731 †
Chetwynd, L. W. P., Explanation of adjustment of ships' compasses, 733 †
Chevalier, A., Côte d'Ivoire: la forêt vierge, 729 †
Chichilticalli, Mexico, 92
Childers, S., A Mariner of England, 86 §
Chile—
Cordillera, coastal, studies of geology and geography: P. D. Quensel, 230
Landeskunde von Chile: C. Martin, 731 †
Linea de frontera con la República Arjentina: L. R. Patron, 342 †
Maps: Atlas de la Republica de Chile, 625 †; Comision Chilena de Limites. Mapas de la Rejion-Andina, 624 †
Oficina de Mensura de Tierras, Primera memoria del director de la, 617 †
Chi-li—
Maps: Tschili und Schantung (K. Preuss. Landesaufnahme), 110 †
Chiloe, Excursions by Swedish Magellanic Expedition in, 289
China—
Expedition, H. D'Ollone's, 327
Expedition Filchner nach China und Tibet, Wissenschaftliche Ergebnisse, IX. Band: G. von Elsner, 614 †

China—*continued.*
Geography, Comprehensive, of the Chinese Empire: L. Richard, 200 §
Maps: Map of China showing Railways, Telegraphs, and Treaty Ports (Geog. Section, General Staff), 736 †; Tschili und Schantung (K. Preuss. Landesaufnahme), 110 †
Photographs of Shan-tung, Chiang-su, and Chiang-hsi provinces: H. R. Davies, and A. H. Hilton-Johnson, 627 †; Photographs of Western China: J. W. Brooke, 739 †
Physical, etc., conditions of Ichang and neighbourhood (Consular Reports), 340 †
Through China to Tibet in 1906: J. W. Brooke, 614 †
Trade and Administration of Chinese Empire: H. B. Morse, 614 †
Trade and Commerce of district of Chinan Fu, Report for 1907 (Consular Reports), 340 †
Trade and Trade Reports, Returns of, 1907..101 †
Chinghiz Khan, burial-place of, 677
Chisholm, G. G., Definition of Geography, 95, 221, 573; Handbook of commercial geography, 107 †; Meaning and Scope of Geography, 346 †; remarks on "Geographical Conditions affecting British Empire," 476
Chree, C., Temperature observations at *Discovery's* winter quarters, 189
Chrystal, G., Theory of leaking microbarograph, etc., 620 †
Chukar river, Tibet, 401
Church, G. E., letter on Navigability of Amazons, 607; remarks on: "Panama Canal in 1908," 177; "River Paraná: an Economic Survey," 39
Churchill, Right Hon. W. S., My African Journey, 228 †, 323 §
Cipriani, Don C., Photographs of Rio Perené, Peru, 740 †
Ciria y Vinent, J. de, Provincia di Zamora y el lago di San Martin de Castañeda, 727 †
Claparède, A. de, Coup d'œil sur la Société de Géographie de Genève depuis sa fondation en 1858..346 †
Clark, R. C., Beginnings of Texas, 1684–1718..342 †
Clarke, Captain, Authentic narrative of a voyage performed by Captains Cook and Clarke, 1776–1780: W. Ellis, 108 †
Clarke, F. W., Data of Geochemistry, 310 §
Claxton, T. F., Annual report of Director of Royal Alfred Observatory, 341 †; Results of Observations made at Royal Alfred Observatory, Mauritius, 341, 508 †
Clerget, P., Géographie de la vigne et la crise viticole, 620 †
Climatology—
Handbuch der Klimatologie: J. Hann, 106 †
Climatology—*continued.*
Meteorologie und Klimatologie: W. Trabert, 619 †
Relations between climate and terrestrial deposits: J. Barrell, 619 †
Vertrocknungsprozess der Erde und Deutschlands verkehrte Wasserwirtschaft: F. König, 618 †
Close, C. F., Recent Progress in Geographical Work, 573 *
Coast Erosion, Royal Commission on, 578
Cobham, C. D., and G. Mariti, Travels in Island of Cyprus, 713 §, 728 †
Cockburn, J., and others, A Journey overland from Gulf of Honduras to Great South Sea, 108 †
Codrington, R., obituary, 222
Coleman, A. P., Causes of mountain forms in Canadian Rockies, 731 †
Collier, A. J., and others, Gold placers of parts of Seward Peninsula, Alaska, 104 †
Colombia—
Boundary between Brazil and Colombia, 92
Por el Sur de Colombia; excursion pintoresca y cientifica al Putumayo: M. Triana, 731 †
Colonization—
Colonisation chez les Peuples modernes: P. Leroy-Beaulieu, 84 §
Tropen akklimatisieren, Kann der Deutsch sich in den: Steudel, 345 †
Colorado—
Canyon Voyage: F. S. Dellenbaugh, 616 †
Colorado Canyon—Some of its Lessons: W. M. Davis, 535 *
Geology of Rangely Oil District: H. S. Gale, 230 †
Temperatures, Comparison of, between Colorado springs and Lake Moraine: F. H. Loud, 731 †
Colquhoun, A. R., Dan to Beersheba, 234 †, 317 §
Commerce—
Leitfaden der Handelsgeographie: M. Ekert, 234 †
Commerson, P., Life of: S. P. Oliver, 714 §
Compass—
Adjustment of Ships' compasses, explanation of: L. W. P. Chetwynd, 633 †
Schwingungsbeobachtungen mit der Horizontalnadel auf see: F. Bidlingmaier, 343 †
Congo, French—
Régions comprises entre la Haute-Sanga, le Chari et le cameroun: — Lœfler, 508 †
Congo State—
Chemins de fer du Congo supérieur aux grands lacs africains, Construction en régie des, 507 †
Congo Belge. Une séance historique: A.-J. Wauters, 102 †

Congo State—*continued.*
Derniers jours de l'Etat du Congo: E. Vandervelde, 729 †
Géologie de l'itinéraire de Kabinda à Kikondia: J. Cornet, 615 †
Grenfell, George, and the Congo: Sir H. Johnston, 491 §
Il Congo: E. Baccari, 228 †
Mahagi, Au pays de: — Demuenynck, 103 †
Moniteur Belge: Journal officiel, 507 †
Traité de cession de, Etat Indépendant du Congo à la Belgique, 507 †
Constantinople, Map of: S. Schropp, 735 †
Conway, Sir M., remarks on "Discoveries in Southern Tibet," 420
Conwentz, H., Care of Natural Monuments, 590 §
Cook, Captain: Authentic narrative of a voyage performed by Captains Cook and Clarke, 1776–1780: W. Ellis, 108 †
Cook, F. A., First ascent of Mount McKinley, 104 †
Cordier, H., Bibliotheca Indo-Sinica. I^re^ partie, Birmanie et Assam, 506 †
Cornet, J., Géologie de l'itinéraire de Kabinda à Kikondia, 615 †
Cornish, V., letter on Further Observations of Deep-sea Waves now required, 500; letter on Health on Isthmus of Panama, 609; Panama Canal in 1908.. 153 *; Panama Canal and its builders, 731 †; remarks on "Scenery of Cuba, Hispaniola (Haiti), and Jamaica," 668
Cornwall—
Geological aspect of lodes of Cornwall: D. A. Macalister, 339 †
Coronado's route through Northern Mexico and Arizona, 91
Corrientes river, South America, 14
Corsica—
Corsica: J. M. Chapman, 84 §
Through Corsica with a paint-brush: E. R. Whitwell, 100 †, 321 §
Traces d'un mouvement positif le long des côtes occidentales de Corse: P. Castelnau, 612 †
Zone de contacts anormaux, Sur la persistance à travers toute la Corse d'une: J. Deprat, 504 †
Cortés, F., Letters of: F. A. MacNutt, 80 §
Cortes, M., Arte of Navigation, 108 †
Cortier, M.: *see* Arnaud, E.
Costa Rica—
Memoria de Relaciones Exteriores, Justicia . . . presentada al Congreso Constitucional, 230 †
Cottes, —, Sylve équatoriale et les anthropophages, 341 †
Covert, C. C.: *see* Prindle, L. M.
Craig, J. J. (*see also* Wade, E. B.), Notes on an expedition to Addis Ababa, 228 †; Relation between Nile floods and atmospheric pressure, 508 †
Craig, W., North Dakota Life, 342 †
Crampel, Fort, Rainy Season, 701
Crawley-Boevey, A. W., Map and description of Jerusalem by Christian van Adrichem (1533–1585), 729 †
Crignoux, M., Calabria, Earthquakes, and Geological Structure of, 716
Crinò, S., I Monti Erei, 726 †
Cruz, V., Photographs of Northern Nigeria, 240 †
Cuba—
Disease in Panama and Cuba, Some practical points in prevention of: W. G. Macpherson, 231 †
Scenery of Cuba, Hispaniola (Haiti) and Jamaica: Sir H. Johnston, 629 *
Cubero, P., Peregrinacion del Mundo, 108 †
Cupet, P. P., Populations de l'Indo Chine, 506 †
Currents: *see* Oceanography
Curtin, J., Mongols: a History, 320 §
Curtis, R. H., Barometrical observations at *Discovery's* winter quarters, 190
Curzon, Lord, Scientific Results of Dr. Sven Hedin's Expedition, 435 *
Cvijić, J., Beobachtungen über die Eiszeit auf der Balkanhalbinsel, etc., 505 †; Grundlinien der Geographie und Geologie von Mazedonien und Altserbien, etc., 99 †
Cyprus—
Civil List, 1908: T. H. Richards, 101 †
Travels in Island of Cyprus: G. Mariti and C. D. Cobham, 713 §, 728 †
Czernowitz university, Appointment of A. von Böhm to Geographical Chair at, 605

D.

Dahlgren, E. W., Relations Commerciales et maritimes entre la France et les côtes de l'Océan Pacifique, 734 †
Dakota—
North Dakota life: W. Craig, 342 †
Dalelf—
Régime hydrologique du Dalelf: A. Wallén, 727 †
Dam-largen-la, Tibet, 361
Dammköhler-Fröhlich Expedition in German New Guinea, 333
Dan to Beersheba; work and travel in four continents: A. R. Colquhoun, 234 †, 317 §
Dangra-yum-tso, Tibet, 366
Danmark fjord, Greenland, 46, 52
Dann, E. W., Historical Geography on a Regional Basis. The British Isles and Europe, 208 §
Danneberg, A., Beobachtungen an einigen Vulkanen Mexikos, 731 †
Dannevig, H. C., On some peculiarities in our coastal winds, etc., 105 †
Darwin, L., remarks on: Annual Awards, 610; "Baghdad to Damascus *viâ* El Jauf," 535; "Colorado Canyon—some of its Lessons," 539; "Danish North-East Greenland Expedition," 61; "Dis-

coveries in Southern Tibet," 429; "Fifty Years of Nile Exploration," 147: "Geographical Conditions affecting British Empire," 477; "Journey from Tripoli across Sahara to Lake Chad," 264, 266; "Journeys in Tibet, 1906–1908," 392; "Panama Canal in 1908," 177, 180; "Proposed North Polar Expedition," 456, 461; "Proposed Sledge Expedition across North Polar Region," 695; "River Paraná: an Economic Survey," 36; "Scenery of Cuba, Hispaniola (Haiti), and Jamaica," 666, 668

Darwin, Sir G., Report of Committee . . . on measurement of further portion of geodetic arc of Meridian north of Lake Tanganyika, 729 †

David, T. W. E., Journey to South Magnetic Pole, 572

Davidson, G., Sir Francis Drake's Voyage on Coast of California, 216

Davies, H. R., Yün-nan: link between India and Yangtze, 728 †

Davies, H. R., and A. H. Hilton-Johnson, Photographs of Shan-tung, Chiang-su, and Chiang-hsi provinces, 627 †

Davis, W. M., Colorado Canyon—some of its Lessons, 535 *; Definition of Geography, 574; Methoden der amerikanischen geographischen Forschung, 731 †; Practical Lessons in Physical Geography, 318 §; remarks on "Scenery of Cuba, Hispaniola (Haiti), and Jamaica," 668

Dead sea, E. Huntington's expedition to, 87

Delaim tribe, Arabia, 519

De la Rosa, M. G., Découverte de trois précieux ouvrages du Métis péruvien Blas Valera, qu'on croyait détruits en 1596..732 †

Dellenbaugh, F. S., A Canyon Voyage, 616 †, 714 §

Demuenynck, —, Au pays de Mahagi, 103 †

Denmark—
Admiralty Charts (K. Danske Søkort-Arkiv.), 350 †
Coasts of Denmark, Changes in sea-level on: S. Sovyetof, 504 †
Fortegnelse over fyr og taagesignal-stationer i Kongeriget Danmark med tilande, 1909..611 †
Grass-wrack in Danish waters, Ecology and distribution of: C. H. Ostenfeld, 503 †

Dent, H. C., obituary, 607

Denucé, J., Origines de la Cartographie portugaise et les cartes des Reinel, 686 §

Deprat, J., Sur la persistance, à travers toute la Corse, d'une zone de contacts anormaux, 504 †

Derbyshire—
Glaciers in Derwent Valley, Effects of: E. M. Wrench, 506 †
Derwent valley, Effects of glaciers in: E. M. Wrench, 506 †

Desplagnes, Lieut., Archæological and Ethnological Investigations in Western Sudan, 720

Detlefsen, D., Geographie Afrikas bei Plinius und Mela und ihre Quellen, 598 §, 615 †

Devon—
Volcanoes of Devon, Ancient and perished: A. Somervail, 727 †

Dew-ponds—
Some considerations concerning dew-ponds: E. A. Martin, 618 †

"Diagram" Hand Atlas, Philips': B. B. Dickinson and A. W. Andrews, 625 †

"Diagram" Hand-Maps: B. B. Dickinson and A. W. Andrews, 114 †, 235 †, 346 †

Dickinson, B. B., and A. W. Andrews, "Diagram" Hand Maps, 114 †, 235 †, 346 †; Philips' "Diagram" Hand Atlas, 625 †

Diehr, M., Bericht über eine Reise in das Innere der Insel Hainan, 614 †

Dines, W. H., Temperature observations at *Discovery's* winter quarters, 189

Dirr, A., Heutigen Namen der kaukasischen Völker, 507 †

Discovery, Meteorological work of the, 188

Ditchfield, P. H., Memorials of Old London, 226 †, 312 §

Dittrich, G. von, Geologie und Kartographie in ihrer gegenseitigen Beziehung bei der Terraindarstellung in Karten, 343 †

Domann, B.: *see* Habenicht, H.

Dong-ko, Mount, Hainan, 718

Dorington, Sir J., remarks on "Fifty Years of Nile Exploration," 149

Doumergue, —, and E. Ficheur, Notice explicative de la Carte géologique d'Oran, 615 †

Downing, A. M., Total solar eclipse of 1911..618 †

Dowson, E. M., Appointment as Director of Egyptian Surveys, 605; Determination of altitudes by levelling, 232 †

Drake, Sir Francis—
Drake Medal: J. D. Hague, 345 †
Voyage on Coast of California: G. Davidson, 216

Drude, O., Deutschlands Pflanzengeographie, 108 †; Pflanzengeographische Karten aus Sachsen, 101 †

Druses tribe, North Arabia, 533

Drygalski, E. von, Deutsche Südpolar-Expedition, 1901–03..232 †, 618 †

Dubois, F., Region of Gao on Middle Niger, 720

Duchesne-Fournet, J., Afrique Occidentale Française, 616 †

Duñcas, E. I., Fisionomia minera de las provincias de Tayacaja, Angaraes y Huancavelica, 732 †

Du Fief, J. B., obituary, 336

Dungel, A., Flachgräber der Hallstattzeit bei Statzendorf in Niederösterreich, 99 †

Dunn, J., History of Oregon Territory, etc., 108 †
Dunn, S. T., Botanical Expedition to Central Fokien, 101 †, 213 §
Dunstan, B., and H. W. Fox, Geological Sketch-map of Queensland showing mineral localities, 114 †
Dunstan, G., Rivers of Axholme, 727 †
Dunstan, W., remarks on "Journey from Tripoli across Sahara to Lake Chad," 265; Report on Agriculture in Asia Minor, 212 §, 340 †
Dupontès, P. C., Les petites Antilles, 732 §
Dürer, A., and other Artists of the Renaissance in Relation to Geography, 501
Dzong-tea crater, Hainan, 718

E.

Earth—
Face of the Earth (das Antlitz der Erde): E. Suess, translated by H. B. C. Sollas, 106 †
Geschichte der Erde und des Lebens: J. Walther, 233 †
Lunar observations and figure of the Earth: E. B. H. Wade, 343 †
Physics of the Earth, Further researches on: T. J. See, 344 †
Earthquakes—
Calabria and its Earthquakes: M. Crignoux, 716
Causes of, 578
Earthquake Sound: F. Omori, 733 †
Geographische Verbreitung . . . den Erdbebenbeobachtungen des Jahres 1903: E. Tams, 510 †
Physics of earthquake phenomena: C. G. Knott, 107 †
Recent Earthquakes: R. D. Oldham, 294 *
Variations de latitude et tremblements de terre: F. de Montessus de Ballore, 510 †
Volcanoes and earthquakes: E. J. Houston, 233 †, 593 §
East Indies—
Ost Indische Reise-Beschreibung, 1680: E. Hessen, 108 †
Travels of Richard Bell in East Indies, Persia, and Palestine: Sir R. C. Temple, 101 †
Eckert, M., Leitfaden der Handelsgeographie, 234 †
Eckhardt, W. R., Wälder der Heimat, 612 †
Eclipse—
Total solar eclipse of 1911: A. M. Downing, 618 †
Ecuador—
Boundary between Peru and Ecuador, 92
High Andes of Ecuador, In the: H. Meyer, 82 §
Edelmann, A., Oberbayerischen Seen, 612 †
Edward, Lake (Albert Edward) Central Africa, 151
Egypt—
Cadastral survey of Egypt, 1892–1907: H. G. Lyons, 729 †
Coton en Égypte, Production du: F. C. Roux, 228 †
Desert of Egypt, South-Western: W. F. Hume, 103 †
Desert water supplies: J. Ball, 507 †
Helwan Observatory, Upper Air research at: B. F. Keeling, 103 †
Irrigation services in Egypt and Sudan, Reports upon administration of, 615 †
Maps: Topographical map of Aswan Province (Survey Dept., Cairo), 113 †; Topographical Maps of Egypt (Survey Dept., Cairo), 348 †, 624 †, 736 †
Meteorological Report for 1906. . 616 †
Petrography of Egypt, Notes on: W. F. Hume, 615 †
Survey Department, Appointment of E. M. Dowson as Director, 605; Report on Works for 1907: H. G. Lyons, 103 †, 314 §
Topography and geology of district between Cairo and Suez: T. Barron, 103 †
Underground water of Egypt, Notes on: H. W. Beckett, 103 †
Upper air investigations in Egypt: B. F. Keeling, 508 †
Eickener See: O. Teichmann, 504 †
Ekhoff, E., Gothland und Wisby in ihren Beziehungen zum Auslande, besonders zu Deutschland, 505 †
Elbe—
Niederelbe: R. Linde, 100 †
El Jauf, North Arabia, 517
Elliot, G. F. Scott: *see* Scott Elliot, G. F.
Ellis, T. S., On low-water channels in rivers and estuaries, 344 †
Ellis, W., Authentic narrative of voyage performed by Captains Cook and Clarke, 108 †
Ells, R. W., Geology and mineral resources of New Brunswick, 616 †; Geology of Trinidad and Barbados, 343 †; Oil-fields of Eastern Canada, 730 †
El Shedad, Jebel, Arabia, 532
Elsner, G. von, Barometrische Höhenmessungen und meteorologische Beobachtungen (China and Tibet), 614 †
Elter, A., Itinerastudien, 734 †
Elton, E. W., Class-room Atlas of physical . . . geography, 114 †
Endi region, French West Africa, 499
Engelbrecht, T. H., Geographische Verteilung der Getreidepreise in Indien, 506 †
England—
Harrison's Description of England in Shakespeare's Youth: F. J. Furnivall, 591 §, 613 †
Itinerary of John Leland: L. T. Smith, 591 §, 613 †
Maps: "Diagram" Series of Hand-

England—*continued.*
maps: B. B. Dickinson and A. W. Andrews. Tyne Gap and North England, 235 †, 346 †
England and Wales—
Cartography of counties of England and Wales: H. G. Fordham, 339 †
Maps: Geological Surveys, † 236, 347, 512, 623; Official Railway Map of England and Wales (Railway Clearing House), 110 †; Ordnance Surveys, † 109, 236, 347, 512, 622, 735; Philips' Handy Administrative Atlas of England and Wales, 235 †
Engler, A., Pflanzenwelt Afrikas insbesondere seiner tropischen Gebiete, 102 †, 584 §
Enock, C. R., Peru, 81 §
En Route: R. Trevor, 85 §
Entre Rios province, Argentine, 22
Eötvös, L., Gradients of gravitational force in Southern Alföld, 325
Erdmann, H., Alaska. Ein Beitrag zur Geschichte nordischer Kolonisation, 342 †
Erebus, Mount, Antarctic, Ascent of, 572
Erei—
I Monti Erei: S. Crinò, 726 †
Erichsen, M., death of, 59; Expédition Mylius Erichsen dans le Grönland nord-orientale: C. Rabot, 343 †
Erichsen, N.: *see* Ross, J.
Ernst, A., New flora of volcanic island of Krakatau, 227 †
Eskimo—
People of the Polar North: K. Rasmussen, 106 †, 204 §
Esperanto self-taught, with phonetic pronunciation: W. W. Mann, 234 †
Essex—
Cambridge County Geographies. Essex: G. F. Bosworth, 727 †
Estancia plains, Geotectonics of: C. R. Keyes, 342 †
Estrella, J. C. C. de, El felicissimo viaje d'el muy alto y muy poderoso Principe Don Phelippe, etc., 108 †
Etheridge goldfield, Sketch-map of: W. H. Greenfield, 114 †
Euphrates—
Aussichten auf eine Wiederbelebung der Kultur der Euphrat- und Tigrisniederung: W. Kurz, 507 †
Europe—
Bird-hunting through wild Europe: R. B. Lodge, 225 †, 321 §
Cartography: Entwickelung des Kartenbildes der Nord- und Ostseeländer bis auf Mercator, etc.: E. Moritz, 211, 505 †; Kartenwerke der europäischen Staaten, Militärisch wichtigsten: V. H. von Hartenthurn, 504 †
Cereal Production of Europe: F. R. Rutter, 100 †
East End of Europe: A. Upward, 226 †, 321 §
En Route: R. Trevor, 85 §
Geographical comparison between Europe and North America: A. Penck, 604
Geographical conditions affecting British Islands, 463
Grain Trade, European: F. R. Rutter, 109 †
Lands beyond the Channel: H. J. Mackinder, 99 †, 318 §
Maps: Bartholomew's Contour Motoring Map of Central Europe, 513 †
Uebersichtskarte von Mitteleurope (K. Preuss. Landesaufnahme), 623 †
Mensch zur Eiszeit in Europa: L. Reinhardt, 83 §
Pêches maritimes des pays du Nord de l'Europe, Bulletin statistique des, 505 †
Temperature, Range of monthly mean, at Edinburgh, Vienna, and Stockholm: R. T. Omond, 504 †
Voyage en divers états d'Europe et d'Asie, entrepris pour découvrir un nouveau chemin à la Chine: P. Avril, 108 †
Evans, Dr., remarks on "Isohyets 'twixt Sahara and Western Sudan," 705
Évreux, Yves d' (Biography): G. Marcel, 334 §, 510 †
Exploration, Problems in, II. Ordos: W. R. Carles, 668 *
Eylmann, E., Eingeborenen der Kolonie Südaustralien, 106 †

F.

Fairgrieve, J., The round world: an elementary geography, 234 †
Famagusta: G. Jeffery, 101 †
Far East, Wandering Student in the: Earl of Ronaldshay, 226 †, 489 §
Färoe Islands—
Botany of the Færöes, based upon Danish investigations, 612 †
Färoes, The: E. Ransom, 100 †
Photographs of Iceland and Faröe Islands: J. F. Stackhouse, 351 †
Fauna—
Afrikanische Elemente in der neogenen und quartären Fauna von Südwest Europe: T. Arldt, 345 †
Favene, E., obituary, 337
Fawcett, P. H., Survey work on Frontier between Bolivia and Brazil, 181 *
Fayum—
Étude sur la topographie du Fayoum: B. Apostolidis, 615 †
Fehlinger, H., Beiträge zur Ethnographie von Nord-Luzon, 507 †
Feilden, H. W., remarks on: "Danish North-East Greenland Expedition," 63; "Proposed Sledge Expedition across North Polar Region," 695
Ferguson, D., Hotz' Journal der Reis van den Cezant O. I. Compagnie Joan Cunaeus naar Perzie in 1651-1652 door Cornelius Speelman,' 706 †

Fern gully, Jamaica, 665
Fernand, C., Considérations ethnographiques et géologiques sur les environs de Montpellier, 100 †
Ferrara, R. da, Una descrizione inedita dell' Italia di: P. Gribaudi, 613 †
Fezzan, North Africa, 255
Field, M., and Sir W. J. Wharton, Hydrographical surveying, 733 †
Fiji—
Fijians, The, A study of decay of custom: B. Thomson, 203 §, 231 †
Map: Fiji Islands (Lands Dept.), 515 †
Photographs of Hawaii and Fiji Island, 739 †
Filippi, F. de, Il Ruwenzori, Viaggio di Esplorazione e primi Ascenzioni, 75 §; Ruwenzori: An account of expedition of H.R.H. Duke of the Abruzzi, 75 §, 229 †
Findlay's Sailing Directory for North Pacific ocean and Japan, Supplement to: W. R. Kettle, 510 †
Fipa Language, Vocabulary of: B. Struck, 228 †
Fischer, H., Landeskunde der Vereinigten Staaten von Nordamerika, 230 †.
Fishbourne, C. E., Lake Kioga (Ibrahim) Exploratory Survey, 1907–08..192 *; photographs of Uganda, 628 †
Fletcher, H., Summary Report on Explorations in Nova Scotia, 1907..730 †
Fleurieu—
Nom de Fleurieu dans la géographie, 346 †
Foà, E., Resultats scientifiques des voyages en Afrique, 615 †
Foerstner volcano, Mediterranean, 722
Fokien—
Botanical Expedition to Central Fokien: S. T. Dunn, 101 †, 213 §
Fordham, H. G., Cambridgeshire Maps, 226 †; Notes on cartography of counties of England and Wales, 339 †
Forest—
Forest scenery and other woodland views, remarks on: W. Gilpin, 108 †
Forfarshire—
Old Red Sandstone of Forfarshire: G. Hickling, 339 †
Formosa—
Ethnographischer Bericht über die Insel Botel Tobago: O. Scheerer, 506 †
Flora Montana Formosæ: B. Hayata, 227 †, 497 §
Fournereau, L., Siam ancien; archéologie, épegraphie, géographie, 728 †
Fox, C. D., On glaciers . . . in South Island of New Zealand, 509 †
Fox, H. W.: *see* Dunstan, B.
Foy, K., Windrose bei Osmanen und Griechen: F. Giese, 734 †
Fram, New Arctic voyage in the, 455, 456
France—
Carte de France, Procès de la: P. Girardin, 100 †
France—*continued.*
Catalogue des plans de Paris et des Cartes de l'Ile de France, etc.: L. Vallée, 726 †
Genre particulier de fond marin dans l'étang de Thau: L. Sudry, 612 †
Grottes de Sabart: — Molard et E.-A. Martel, 612 †
Maps: France (Service Géo. de l'Armée), 236 †, 347 †, 513 †; France (Ministre de l'Intérieur), 236 †, 513 †
Régions naturelles et noms de pays: L. Gallois, 225 †
Sambre supérieure, Capture de la par l'Oise: C. Rabot, 100 †
Steingeräte des französischen Altpaläolithikums: H. Obermaier, 100 †
Frankfort—
Statistische Jahresübersichten der Stadt Frankfurt am Main, 100 †
Fraser, C., and J. H. Adams, Geology of Coromandel subdivision, Auckland, 196 †
Fraser, D., Short Cut to India, 707 §, 729 †
Fraunberger, Dr., Rain curves in Niger bend region, 698
French colonies—
Valeur de notre domaine coloniale: M. Zimmermann, 621 †
Frenzel, R., Malthe Conrad Bruun, 620 †
Freshfield, D. W., remarks on: "Discoveries in Southern Tibet," 421; "Fifty Years of Nile Exploration," 150
Freydenberg, H., Etude sur le Tchad et le Bassin du Chari, 584 §
Freytag, G., Ausflugskarte, 621 †, 735 †; Grenzgebiete Oesterreich-Ungarns und Serbiens (Map), 622 †; Karte des Landes Vorarlberg, 621 †; Verkehrs-Karte von Oesterreich-Ungarn, 511 †; Verkehrsplan der k.k. Reichshaupt- und Residenzstadt Wien, 621 †, 735 †
Friederici, G., Expedition in Bismarck Archipelago, 333
Frischauf, J., Wahl der Projektion für Karten grossen und mittlern Massstabs, 343 †
Frobenius, L., Archæological and Ethnological Investigations in Western Sudan, 720
Fröhlich, O., Durch das Innere von Kaiser-Wilhelmsland, etc., 333 §, 343 †
Fry, C. S., Text-book of Geography, 209 §
Fryer, J. C., Explorations in the Seychelles, 214
Furnivall, F. J., Harrison's Description of England in Shakespere's youth, 591 §, 613 †.

G.

Gadow, H., Through Southern Mexico, 104 †, 587 §
Gagel, C., Ueber die Bezeichnung der Vulkanischen Kesseltäler und Schluchten, 733 †
Gale, H. S., Geology of Rangely Oil District, Colorado, 230 †

Galicia, Switzerland of Spain: A. M. B. Meakin, 713 §, 726 †
Galle, D. A., Lotabweichungen im Harz und in seiner weiteren Umgebung, 612 †
Gallieni, —, Neuf ans à Madagascar, 581 §, 616 †
Gallois, L., Régions naturelles et noms de pays, 225 †
Galton, Sir F., Memories of my Life, 205 §, 234 †; Suggestions for improving literary style of scientific memoirs, 511 †
Gambaga-Land: F. Giezendanner, 228 †
Gao region on Middle Niger: F. Dubois, 720
Gardiner, J. S., Explorations in the Seychelles, 214
Garrett, F. R. H., Photographs of Dutch Borneo, Japan, etc., 738 †
Garry. Loch, Temperature of: E. M. Weidenburn, 715
Garstin, Sir W., Fifty Years of Nile Exploration and some of its results, 117 *
Garwood, E. J., Note on a new sounding machine for use on lakes and rivers without a boat, 510 †
Gatrun oasis, Sahara, 243
Gatun dam of Panama canal, 160
Geinitz, E., Ergebnisse der Brunnenbohrungen in Mecklenburg, 612 †
Geneva—
Société de Géographie de Genève depuis sa fondation en 1858, Coup d'œil sur la: A. de Claparède, 346 †; Célébration du cinquantième anniversaire de la fondation de la Société de Géographie de Genève, 621 †
Gennerich, E., Flüsse Deutschlands, 100 †
Gentil, L., Rapport sur les recherches faites en 1902 dans la région Nedroma-Nemours, 615 †
Geochemistry, Data of: F. W. Clarke, 310 §
Geodesy—
Conférence Générale de l'Association Géodesique Internationale réunie à Budapest, Rapports: H. G. Bakhuyzen, 232 †
Investigations in India, Africa, and America, 574
Measurement of further portion of geodetic arc of meridian north of Lake Tanganyika, Report of Committee: Sir G. Darwin, 729 †
Geographical Congress—
Ninth International, Resolutions for Oceanographical Work, 71
Geographical Literature of the Month—
Africa, 102, 228, 340, 507, 615, 729
America, 103, 229, 342, 508, 616, 730
Anthropogeography and Historical Geography, 107, 234, 345, 620, 734
Asia, 101, 226, 340, 506, 613, 727
Australasia and Pacific Islands, 105, 231, 343, 509, 617
Biography, 234, 345, 510, 620
Geographical Literature of the Month—*continued*.
Europe, 99, 224, 339, 503, 611, 726
General, 107, 234, 346, 511, 621, 734
Mathematical Geography, 106, 232, 343, 509, 733
Physical and Biological Geography, 106, 233, 344, 510, 618, 733
Polar Regions, 106, 232, 343, 618, 732
Geographical Names—
Schreibung geographischer Namen, Ueber die: W. Köppen, 511 †
Geographical Pictures, Philips': P. H. L'Estrange, 712 §
Geography—
Amerikanischen geographischen Forschung, Methoden der: W. M. Davis, 734 †
Apparatus for instruction in geography and structural geology: W. H. Hobbs, 621 †
Association of American Geographers, Annual Meeting, 221
Commercial Geography, Handbook of: G. G. Chisholm, 107 †; Leitfaden der Handelsgeographie: M. Eckert, 234 †
Definition of Geography: G. G. Chisholm, 95, 221; Definition of word "geography," 573
Dottrine geofisiche di Bernardino Telesio: R. Almagià, 734 †
Einführung in den erdkundlichen Unterricht an mittleren und höheren Schulen: F. Lampe, 234 †
Elements of Geography: H. N. Stephenson, 208 §
Géographie nouvelle: G. Louis-Jaray, 621 †
Géographie sociale: C. Vallaux, 107 †
Geographisches Handbuch: A. Scobel, 511 †
Handbook of Geography: E. Reich, 107 †
Historical Geography on a Regional Basis. The British Isles and Europe: E. W. Dann, 208 §
Human side of systematic geography: W. S. Tower, 620 †
Ideal geográfico y los progresos de la geográfia: R. Beltrán y Rózpide, 621 †
Lands beyond the Channel: H. J. Mackinder, 318 §
Lectureship at Glasgow University, 220
Leonardo da Vinci and Art of the Renaissance in its Relation to Geography: E. Oberhummer, 540 *
Meaning and Scope of Geography: G. G. Chisholm, 95 §, 346 †
Oxford Geographies. Practical Geography. Part I.: J. F. Unstead, 235 †, 318 §
Oxford School of, Report for 1908..500
Practical Exercises in Physical Geography: W. M. Davis, 318 §

Geography—*continued.*
Primer of Practical Geography: J. W. Henderson, 209 §
Progress, Recent, in Geographical Work: C. F. Close, 573 *
Rational Geography: E. Young, 209 §
Regional Geography — Asia: J. B. Reynolds, 209 §; Ditto, British Isles: J. B. Reynolds, 235 †
Round World, An elementary geography: J. Fairgrieve, 234 †
School Text-book of Geography: L. W. Lyde, 208 §
Scientific Geography. I. The World: E. W. Heaton, 209 §
Text-book of Geography: C. S. Fry, 209 §
Geological History—
Palāogeographie (Geologische Geschichte der Meere und Festländer): F. Kossmat, 619 †
Geology—
Geologie: F. Löwl, 619 †
Relation of geology to topography: D. W. Johnson and F. E. Matthes, 619 †
Traité de géologie. Tome II. Les périodes géologiques: E. Haug, 233 †
Unterricht in Geologie und verwandten Fächern auf Schule und Universität: G. Steinmann, 346 †
Uranium and Geology: J. Joly, 344 †, 619 †
Geomorphology—
"Hartling" für monadnock, etc.: H. Spethmann, 619 †
Relation of geology to topography: D. W. Johnson and F. E. Mathes, 619 †
Geophysics—
Physikalischen Grundlagen der tektonischen Theorien: G. von dem Borne, 233 †
Georgian Bay Ship Canal, Interim Report, 602 §, 616 †
Gerbillon, Père, Visit to the Ordos Country, 669
Germany—
Deutschland, nebst Böhmen und dem Mündungsgebiet des Rheins: A. Zweck, 726 †
Deutschlands Pflanzengeographie: O. Drude, 108 †
Erdkunde in entwickelnder, anschaulicher Darstellung: H. Harms, 726 †
Flüsse Deutschlands: E. Gennerich, 100 †
Gebirgsbau Mitteldeutschlands. Ueber den: T. Lorenz, 612 †
Gestalt der deutschen Ostseeküste: W. Bartels, 225 †, 716 §
Gewitter-Beobachtungen in den Jahren 1903–05, Ergebnisse der: R. Süring, 101 †
Glaziale Stillstandslagen im Gebiet der mittleren Weser: H. Spethmann, 504 †
Germany—*continued.*
Hydrostatische Höhenvergleichungen von 4 Festpunkten auf dem Telegraphenberge bei Potsdam: F. Kühnen, 504 †
Lotabweichungen im Harz und in seiner weiteren Umgebung: D. A. Galle, 612 †
Maps: Karte des Deutschen Reiches (K. Preuss. Landesaufnahme), 513 †
Wälder der Heimat: W. R. Eckhardt, 612 †
Gharian, North Africa, 247
Gherria, North Africa, 248
Giezendanner, F., Das Gambaga-Land, 228 †
Gilpin, W., Remarks on forest scenery and other woodland views, 108 †
Gioja, M., Il criterio ed il metodo geografico di: G. Jaja, 620 †
Girardin, P., Glaciation quaternaire et actuelle en fonction du socle dans la "Savoie Massive," 611 †; Procès de la Carte de France, 100 †; Sur un cas rare de visibilité du Mont Blanc à longue distance, 100 †
Glacial epoch (Ice Age)—
Influence of Glacial epoch upon early history of mankind: G. F. Wright, 345 †
Question des climats de l'epoque glaciaire: H. Arçtowski, 619 †
Glaciers—
Documents nouveau sur les glaciers: E. Chaix-Dubois, 233 †
Histoire des glaciers: H. Arçtowski, 619 †
Glareanus, Maps of: C. R. James, 345 †
Glasgow—
Geographical Lectureship at Glasgow University, 220
Goa—
Maps: Carta do Territorio Portuguez de Goa, 237 †
Godwin-Austen, H. H., remarks on "Discoveries in Southern Tibet," 417
Goeje, C. H. de, Verslag der Toenoekhoemak-Expeditie, 230 †
Goeldi, E. A., Aspectos da natureza do Brazil, 104 †
Gold: its geological occurrence and geographical distribution: J. M. Maclaren, 620 †
Gold Coast—
Gambaga-Land: F. Giezendanner, 228 †
Maps: Wall-map of Gold Coast Colony, etc.: F. G. Guggisberg, 113 †
Gold, E., Report . . . on calculation of wind velocity from pressure distribution, 344 †
Goldie, Sir G., remarks on Cuba, Hispaniola (Haiti), and Jamaica, 667
Goldthwait, J. W., Reconstruction of water plans of extinct glacial lakes in Lake Michigan basin, 342 †
Gonave island, Haiti, 642

Goodfellow, W., Expedition into interior of Dutch New Guinea, 93
Goodwin, H. B., New Lunar and its limits of accuracy, 509 †
Gordon, H. W.: *see* Morris, Sir W. G.
Gothland und Wisby in ihren Beziehungen zum Auslande, besonders zu Deutschland: E. Ekhoff, 505 †
Götzinger, G., Morphologische Bemerkungen zur Dammrutschung bei Ardning, 611 †
Grampians—
Geology and Scenery of Grampians and Valley of Strathmore: P. MacNair, 579 §
Grandidier, G., Européens et Malgaches, 341 †
Grasso, G., Questioni topografiche e topologiche sull' estrema Calabria, 613 †
Gravier, C., Rapport sur une mission scientifique à l'île de San Thomé, 730 †
Gravity—
Bestimmung der Schwerkraft auf den Indischen und Grossen Ozean und an deren Küsten, sowie erdmagnetische Messungen: O. Hecker, 619 †
Schwerkraft auf dem Meere längs dem Abfall der Kontinente gegen die Tiefe: O. E. Schiøtz, 619 †
Greece—
Handbook for travellers: K. Baedeker, 225 †, 321 §
Greenfield, W. H., Queensland, showing principal mining centres and railways (map), 114 †; Sketch-map of Etheridge Goldfield, 114 †
Greenland—
Danish North-East Greenland Expedition: A. Trolle, 40 *
East: E. Mikkelsen's Expedition, 603
Expédition Mylius Erichsen dans le Grönland nord-orientale: C. Rabot, 343 †
Geology and Physical Geography of East Greenland: O. Nordenskjöld, 106 †
Nordenvindens Svøbe, Under: K. Rasmussen, 204 §
People of the Polar North: K. Rasmussen, 106 †, 204 §
Reise nach Westgrönland: G. Stiasny, 618 †
Suboceanic ridge between Greenland and Spitzbergen, 55
Summarisk Oversigt over *Danmark* Expeditionens Forløb og Arbejder: A. Trolle, 343 †
Gregoire, A., Note sur les terres coulantes, 344 †
Grenfell, George, and the Congo: Sir H. Johnston, 491 §
Gribaudi, P., Una descrizione inedita dell' Italia di Riccobaldo da Ferrara, 613 †
Grigorief, A. W., obituary, 96; und H. Michow, Originalkarte Sibiriens aus dem 17. Jahrhundert, 340 †
Grothe, H., Meine Reise durch Vorderasien, 228 †; Studienreise durch Vorderasien, 729 †
Grube, H., Combined maps of London and 25 miles round, 110 †
Grund, A., Oberflächenformen des Dinarischen Gebirges, 611 †
Guayrá lake and falls, South America, 4, 7
Guébhard, A., Camps et enceintes, 345 †
Guggisberg, F. G., Wall-map of Gold Coast Colony, etc., 113 †
Guiana, British—
Geology of goldfields of British Guiana: J. B. Harrison, 230 †
Maps: Northern Portion of British Guiana showing geology, etc.: J. B. Harrison, H. J. Perkins, and C. W. Anderson, 113 †
Guiana, Dutch—
Toemoekhoemak-Expeditie, Verslag der: C. H. de Goeje, 230 †
Guillaume, C. E.: *see* Benoit, J. R.
Guillemard, F. H., Stanford's Compendium of Geography and Travel. Australasia, 714 §
Guinness, G., Peru: its story, people, and religion, 231 †, 593 §
Gulf-stream—
Periodic changes in the Gulf Stream and surrounding waters: S. Sovyetof, 510 †
Gunong Tahan, Malay peninsula, 479
Guring-la, Tibet, 361
Gurla Mandhata, Tibet, 426

H.

Habenicht, H., and B. Domann, Chart of World on Mercator's Projection, 737 †
Haddon, A. C., Percy Sladen Trust Expedition to Melanesia, 105 †
Hague, J. D., Drake Medal, 345 †
Hahn, Dr., Rain Curves in Niger Bend Region, 698
Haïnan—
Explorations in: M. Madrolle, 718
Reise in das Innere der Insel Hainan, Bericht über eine: M. Diehr, 614 †
Haiti—
Maps: Topographische und geologische Karte des zentralen Teiles der Republik Haïti: L. G. Tippenhauer, 625 †
Hajia, Wadi, Arabia, 519
Halkin, J., Monographies de Village, 734 †
Halle, T., Geological observations of Chiloe, 290
Hamada el Homra, 243, 251
Hamberg, A., Methoden der Bestimmung der Gletscherenden . . . in Schwedisch-Lappland, 505 †

Hamilton, R. V., Markham's 'Life of Admiral Sir L. McClintock,' 709 §
Hampshire—
Swallow-holes in Chalk: W. Pitt, 196 *
Hamy, E. T., obituary, 605
Hann, J., Climate of Pelagosa island in the Adriatic, 717; Handbuch der Klimatologie, 106 †
Hanzlik, S., Anti-cyclones in Europe and America, 219
Harker, A., and G. Barrow, Geology of small isles of Inverness-shire, 339 †
Harms, H., Erdkunde in entwickelnder anschaulicher Darstellung, 726 †
Harrison, A. H., In search of a Polar Continent, 1905–07..106 †; Proposed Sledge Expedition across North Polar Region, 689 *
Harrison, J. B., Geology of goldfields of British Guiana, 230 †; and H. J. Perkins and C. W. Anderson, Map of northern portion of British Guiana, showing geology, etc., 113 †
Harrison, Sir R., Recollections of life in British Army during latter half of nineteenth century, 234 †, 324 §
Harrison, W.: Harrison's Description of England in Shakespeare's Youth: F. J. Furnivall, 591 §, 613 †
Hart, S. G., Report on trade between Eastern Bengal and Assam and adjoining foreign tribes and countries, 102 †
Hartenthurn, V. H. von, Militärisch wichtigsten Kartenwerke der europäischen Staäten, 504 †
Hasenkampf, — v.: *see* Hermann, E.
Hassert, K., and F. Thorbecke, Bericht über die landeskundliche Expedition in Kamerun, 328 §, 508 †
Hattersley, C. W., Baganda at home, 210 §, 341 †
Haug, E., Traité de géologie. Tome II. Les périodes géologiques, 233 †
Hauran, Jebel, North Arabia, 532
Hauser, O., Fouilles scientifiques dans le vallée de la Vézère, 504 †
Havana, scenery of, 629
Hawaii—
Photographs of Hawaii and Fiji Islands, 739 †
Hayata, B., Flora Montana Formosæ, 227 †, 497 §
Hazara district, Gazetteer, 1907..102 †
Heaton, E. W., A Scientific Geography, 209 §
Heawood, E., Some cartographical documents of age of great discoveries, 679
Hecker, O., Bestimmung der Schwerkraft auf dem Indischen und Grossen Ozean und an deren Küsten, sowie erdmagnetische Messungen, 619 †
Hector, Mount—
Account of a Visit to Mount Hector: D. Petrie, 509 †, 602 §
Hedin, S., Journey in Central Asia 1899–1902; Scientific Results: W. Broadfoot, 65 §; Journeys in Tibet, 1906–1908. I. General Narrative, 353 *; II. Discoveries in Southern Tibet, 396 *; Reply to Critics, 439
Heilprin, A., Eruption of Pelée, 590 §
Heim, A.: *see* Brockmann-Jerosch, H.
Heintze, A., Växtgeografiska anteckningar från ett par färder genom Skibottendalen i Tromsö amt, 505 †
Hejaz railway—
Chemin de fer musulman du Hedjaz: G. Vasco, 340 †
Helbronner, P., Sixième campagne géodésique dans les hautes régions des Alpes françaises, 100 †
Hellmann, G., Dawn of Meteorology, 510 †
Hellwig, R. L. H., Verrichtingen van het Militaire Exploratie-Detachement op Zuid Nieuw-Guinea, 105 †
Henderson, J. W., Primer of Practical Geography, 209 §
Henderson, P. E., A British Officer in the Balkans, 592 §, 611 †
Hendry, A., Journal of, 1754–55: L. J. Burpee, 229 †
Hengstenberg, E., Hindustan; Indische Reiseeindrücke, 226 †, 322 §
Henry, A., Travels and adventures in Canada, etc., 108 †
Henry, R., Langues française et allemande en Suisse, 727 †
Hepburn, A. B., Artificial waterways and commercial development, 734 †
Hepworth, C., Climatology of South Victoria Land, 188
Herbertson, A. J., Orographical maps and geographical lessons, 346 †; Rain curves in Niger Bend region, 698; remarks on "Isohyets 'twixt Sahara and Western Sudan," 704
Herbst, J. F., Cape of Good Hope. Report on Rietfontein area, 507 †
Hercegovina—
Through Bosnia and Hercegovina with a Print-brush: E. R. Whitwell, 713 §, 726 †
Hernández, P. El extrãnamienta da los Jesuítas del Rio de la Plata y de las Misiones del Paraguay, 230 †
Herrmann, E., and Prof. v. Hasenkampf (Biography of) Carl Christian Koldewey, 346 †
Herwig, W., Beteiligung Deutschlands an der Internationalen muresforschung. IV.–V. Jahresbericht, erstattet von dem Vorsitzenden der Wissenschaftlichen Kommission, 107 †
Herzfeld, E., Reiseroute in West Cilicien (map), 514 †
Hess, F. L.: *see* Prindle, L. M.
Hess, H., Alte Talboden im Rhonegebiet, 99 †
Hessen—
Bodenwasser und Diluvialablägerungen im hessischen Ried: A. Steuer, 504 †
Grossh. Hessischen geologischen Lan-

desanstalt zu Darmstadt, Bericht über die 25-jährige Tätigkeit der: R. Lepsius, 504 †
Hessen, E., Ost Indische Reise-Beschreibung, 108 †
Hettner, A., Definition of word "geography," 573
Heydenreich, A., Karl E. von Baer and services to cause of geography, 724
Hickling, G., Old Red Sandstone of Forfarshire, 339 †
Hickmann, A. L., Geographical Statistical Universal Pocket Atlas, 238 †
Hiebel, A., Seezeichen Leuchtfeuer und Schallsignale des Atlantischen Ozeans, 345 †
Himalayas—
Expedition to, T. Longstaff's, 88
Geodetic observations in, 213
Northern parts of Himalayan system, 108
Photographs of Kumaon and Manasarowar Region of Tibet: T. G. Longstaff, 351 †
Trans-Himalaya Mountain System, 386
Trans-Himalayan Range, letter from T. G. Longstaff on, 97
Hirschi, H., Vorläufiger Bericht über einen geologischer Streifzug in Central Borneo, 227 †
Hispaniola (Haiti)—
Scenery of Cuba, Hispaniola, and Jamaica: Sir H. Johnston, 629 *
Hixon, H. W., Relation of magmatic waters to volcanic action, 345 †
Hlumpo-gangri-Lunkar range, Tibet, 391
Hobbs, W. H., Apparatus for instruction in geography and structural geology, 621 †
Hodson, A. W., Photographs of Bechuanaland Protectorate, 351 †
Hogarth, D. G., remarks on "Baghdad to Damascus *viâ* El Jauf," 533
Holdich, Sir T., remarks on "Discoveries in Southern Tibet," 416; What we have learned from Dr. Sven Hedin, 436 *
Holland—
Maps: Chromo-topographische Kaart van het Koninkrijk der Nederlanden, 623 †; Reiskaart van Nederland: H. Ten Brink, 347 †
Wind als geologische factor in het Gooi: C. L. van Balen, 225 †
Holland, Sir T. H., General Report of Geological Survey of India for 1907.. 506 †; Sketch of mineral resources of India, 227 †
Hollar, W., "Exact Surveigh of Streets, Lanes and Churches contained within Ruines of City of London" (plan), 110 †
Hollis, A. P., Nandi, their language and folk-lore, 615 †
Holt, F., remarks on "River Paraná: an Economic Survey," 37
Holtz, A., Im Auto zu Kaiser Menelik, 102 †, 323 §
Hondius, Jodocus, Map of World, 568
Honduras, Gulf of—
Journey overland from Gulf of Honduras to the Great South Sea performed by John Cockburn and five other Englishmen, 108 †
Hordern, C., Practical uses of Ski, 220
Hordern, C., Notes on uses and possibilities of Ski, 734 †
Hornaday, W. T., Camp Fires on Desert and Lava, 230 †, 323 §
Horsbrugh, C. B., Naturalist's trip to New Guinea, 617 †
Horsley, R., Romance of Empire: New Zealand, 106 †, 324 §
Hotz, A., Journal der reis van den gezant der B. I. Compagnie Jean Cunaeus naar Perzië in 1651–1652, door Cornelius Speelman, 614 †, 706 §
Houston, E. J., The Atmosphere, 233 †, 593 §; Volcanoes and Earthquakes, 233 †, 593 §
Houtum-Schindler, A., Marco Polo's Travels: New editions, 734 †
Hovey, E. O., Ten days in camp on Mount Pelé Martinique, 732 †
Howe, E., Geology of Isthmus of Panama, 231 †
Howley, Archbishop, Labrador boundary question, 229 †, 331 §
Huasco lake-basin, Changes in, 272
Hudleston, W., obituary, 335
Hudson river—
Buried Channels beneath the Hudson and its Tributaries: J. F. Kemp, 508 †
Hume, W. F., Petrography of Egypt, 615 †; South-Western Desert of Egypt, 103 †
Humidity—
Influence of nature of Earth's surface on diurnal variation of absolute humidity: M. M. Rikachef, 620 †
Humphries, T., New Zealand. Report on Survey Operations of Dept. of Lands for 1907–8.. 232 †
Hungary—
Geography in, 325
Hungary and the Hungarians: W. B. F. Bovill, 101 †
Huntington, E., Climate of Ancient Palestine, 326, 729 †; Expedition to Western Asia, 87; Pulse of Asia, 490 §; Relation of Afghanistan to its Neighbours, 101 †
Huron, Lake, Canal to Montreal from, 602
Hydrology—
Loi hydrologique de Minard et Belgrand: E. Maillet, 344 †
Relation of rainfall to the depth of water in a well: J. Smith, 344 †

I.

Ibera Laguna, South America, 13
Ibrahim, Lake: *see* Kioga
Ice and its natural history: J. Y. Buchanan, 344 †

Ice-Age (*see also* Glacial Epoch)—
Zonal-belt hypothesis; a new explanation of cause of Ice Ages: J. T. Wheeler, 233 †, 712 §
Iceland—
Geologie und Morphologie Islands, Einige Hauptzüge der: H. Pjeturss, 612 †
Ice-sheet of Vatna Jökull: H. Spethmann, 595
Inner-Island: H. Spethmann, 225 †
Nordrand des isländischen Inlandeises Vatnajökull: H. Spethmann, 505 †, 595 †
Photographs of Iceland and Faröe Islands: J. F. Stackhouse, 351 †
Quer durch Island: M. von Komorowicz, 612 †
Vulkanologische Forschungen im östlichen Zentralisland: H. Spethmann, 504 †
Idaho—
Geology and ore deposits of Cœur d'Alene district: F. L. Ransome and F. C. Calkins, 230 †
Iguazú falls, South America, 7, 8
Ili river, Central Asia, 279
Imola, town of, Leonardo da Vinci's plan of, 546
India—
Among wild tribes of Afghan frontier: T. L. Pennell, 728 †
Commercial Products of India: Sir G. Watt, 226 †, 322 §
European Travellers in India: E. F. Oaten, 714 §
From Edinburgh to India and Burmah: W. G. Burn Murdoch, 85 §
Geodetic Operations in India, 212, 574
Geographische Verteilung der Getreidepreise: T. H. Engelbrecht, 506 †
Geological Survey, General Report for 1907: Sir T. H. Holland, 506 †
Hindustan: Indische Reiseeindrücke: E. Hengstenberg, 226 †, 322 §
Hindustani self-taught: C. A. Thimm, 226 †
Imperial Gazetteer of India, 226 †
Maps: Government Surveys, 111 †; Mahableshwar Plateau: F. J. Varley, 111 †
Marine Survey of India for 1907-08, Administration Report, 102 †
Meteorological Research in, 88
Mineral resources of India, Sketch of: T. H. Holland, 227 †
Photographs of India and Burma: A. S. Waley, 627 †
Reise des Afanassij Nikitin nach Indien in den Jahren 1466-72: R. Stübe, 506 †
Romance of Empire. India: V. Surridge, 592 §, 614 †
Scientific Advice, Annual Report of Board of, for 1906-07..88 §, 102 †
Short Cut to India: Record of Journey along Baghdad Railway: D. Fraser, 707 §, 729 †
Survey of India, General Report on operations of, 1906-07..576 §, 728 †
Indian ocean—
Maps: Monthly Metecrological Chart of Indian Ocean and Red Sea (Met. Office, London), 116, 239, 350, 516, 626 †, 738 †
Indo-China—
Cambodge et du Bas-Laos, Note sur la géologie du: R. de Lamothe, 614 †
Cours d'eau souterrains du Cammon au Laos: P. Macey, 614 †
Géologie de l'Indo-Chine, Note sur la: H. Lantenois, 614 †
Haut-Tonkin, Contribution à l'étude géologique du: G. Zeil, 614 †
Populations de l'Indo-Chine: P. P. Cupet, 506 †
Quan-ba, Rapport sur la mission de prospection dans la région de: R. Saurel, 614 †
Répartition saisonnière des récoltes et pluviométrie en Indo-Chine: H. Brenier, 614 †
Indus—
Upper branches of the, 403
Inglis, H. R. G., "Contour" Road Book of Ireland, 85 §, 339 †
Inverness—
Garry, Loch, Temperature of: E. M. Wedderburn, 715
Geology of small isles of Inverness-shire: A. Harker and G. Barrow, 339 †
Ireland—
"Contour" Road Book of Ireland: H. R. G. Inglis, 85 §, 339 †
Maps: Handy Administrative Atlases of Scotland and Ireland: G. Philip, 622 †
Oberflächengestalt und Lage Irlands: H. Priester, 727 †
Irish Channel—
Maps: Philips' Ocean Travellers Series. Irish Channel, 512 †
Irving, W., Astoria: or Enterprise beyond Rocky Mountains, 108 †
Isfara—
Glaciers of Upper Isfara, Journey to: L. Berg, 101 †
Isidoro de Sevilla, Mappa Mundi: A. Blázquez y D. Aguilera, 734 †
Isostasy, theory of, 575
Italy—
Central Italy and Rome. Handbook for travellers: K. Baedeker, 726 †
Descrizione inedita dell' Italia di Riccobaldo da Ferrara: P. Gribaudi, 613 †
Earthquake of December, 1908: R. D. Oldham, 185 *
Geografici sulle Frane in Italia, Studi: R. Almagià, 199 §
Mission scientifique en Italie et en

Italy—*continued.*
Tunisie, Rapport: C. G. de Montauzan, 726 †
Osservazioni morfologiche nell' alta Ossola: O. Marinelli, 613 †
Scritti di geografia e di storia della geografia concernenti l'Italia pubblicati in onore di Giuseppe dalla Vedova, 612 †
Shakespeare and the waterways of North Italy: Sir E. Sullivan, 225 †
Itinerarstudien: A. Elter, 734 †
Ivory Coast—
Côte d'Ivoire: la forêt vierge: A. Chevalier, 729 †

J.

Jaeger, F., Bemerkungen zu den Ausführungen von Dr. C. Gagel, 733 †
Jagger, T. A., Evolution of Bogoslof Volcano, 104 †
Jaja, G., Il criterio ed il metodo geografico di Melchiorre Gioja, 620 †
Jamaica—
Scenery of Cuba, Hispaniola, and Jamaica: Sir H. Johnston, 629 *
James, C. R., Maps of Glareanus, 345 †
Japan—
Earthquake Studies in Japan: F. Omori, 723
Earthquakes, severe, in Japan, On average period of: F. Omori, 227 †
Financial and Economic Annual of Japan, 1908..227 †
Maps: Atlas zur Geschichte der Kartographie der Japanischen Inseln: Paul Graf Teleki, 736 †; Topographical map of Japan (Imperial Geol. Survey), 514 †
Nojiri, Lake: A. Tanaka and F. Hirasawa, 728 †
Photographs of: A. S. Waley, 352 †; Photographs of Dutch Borneo, Japan, etc.: F. R. H. Garrett, 738 †
Volcano Ontake: S. Kōzu, 227 †
Wahrhaftige Beschreibungen dreyer mächtigen Königreiche Japan, Siam, und Corea: C. Arnold and others, 107 †
Jeannot, G., Etude sociale, politique et Economique sur le Maroc, 103 †, 583 §
Jebb, L., By Desert Ways to Baghdad, 102 †, 322 §
Jefferson, M., Man in West Norway, 726 †
Jeffery, G., Famagusta, 101 †
Jerusalem—
Map and description of Jerusalem by Christian van Adrichem (1533–1585): A. W. Crawley-Boevey, 729 †
Jochelson, W., The Koryak; material culture and social organization, 507 †; Ethnographic Researches in Kamchatka, 719; Riabouschinsky-Expedition nach Kamtschatka, 728 †
Johnson, D. W., Volcanic necks of Mount Taylor region, New Mexico, 731 †
Johnson, D. W., and F. E. Matthes, Relation of geology to topography, 619 †
Johnson, E. R., Conservation Movement, 342 †
Johnson, T. B., Tramps round the Mountains of the Moon, 85 §
Johnston, Sir H. H., East African Problem, 507 †; Empire and Anthropology, 107 †; George Grenfell and the Congo, 491 §; Scenery of Cuba, Hispaniola (Haiti), and Jamaica, 629 *
Johnston, W. & A. K., Bathy-orographical maps: Africa, 624 †; South America, 515 †; British Isles, 512 †; Edinburgh School Atlas, 349 †; Map to illustrate Near Eastern Question, 235 †; South Polar Chart showing approximate route of Lieut. Shackleton's expedition, 625 †; World-wide Series of Library and Office Maps: South Africa, 624 †
Johnstone, J., Conditions of life in the sea, 107 †
Joly, J., Uranium and Geology, 344 †, 619 †
Joyce, T. A., Note on Native Chart from Marshall Islands in British Museum, 105 †
Juan Fernandez Group, Biological observations, 292
Jubaland—
Map of (Geog. Section, General Staff), 348 †
Jukes-Browne, A. J., Rôle of solution in valley-making, 344 †
Jura—
Juranagelfluh: E. Schaad, 99 †
Jurab district, French West Africa, 499

K.

Kabru in 1907: C. W. Rubenson, 506 †
Kaf, North Arabia, 532
Kailas range, 414
Kaiser, A., Perlfischerleben im Roten Meere, 730 †
Kalahari Bushmen, 601
Kam, Mongolia and: P. K. Kozloff, 310 †
Kamchatka—
Coast of Kamtchatka, Sea of Okhotsk and: Y. Suzuki, 310 †
Expedition to: T. Riabushinsky, 719
Riabouschinsky-Expedition nach Kamtschatka: W. Jochelson, 728 †
Kamerun—
Durch Busch und Steppe von Campo bis zum Schari 1892–1902: O. Zimmermann, 729 †
Geschichte der Erforschung und Eroberung Kameruns: S. Passarge, 341 †
König Ndschoya von Bamum als Topograph: B. Struck, 341 †
Landeskundliche Expedition der K. Hassert und F. Thorbecke in Kamerun, Bericht über die, 328 §, 508†

Kamerun—*continued.*
Urwald-Dokumente: vier Jahre unter den Crossflussnegern Kameruns: A. Mansfeld, 229 †
Verkehrsstrasse von Duala nach der Ostgrenze Kameruns: Baron v. Stein, 508 †
Kan, C. N., Het Afrika-Vraagstuk, 340 †
Kara sea—
Influence of Siberian rivers on waters of: D. Polilof, 507 †
Revanche de la Banquise: Duc D'Orléans, 708 §, 732 †
Karakorum pass, 373
Karst—
Hydrographie des istrischen Karstes: G. A. Perks, 339 †
Kash river and valley, Tian Shan, 287
Kashmir—
Land of streams and solitudes: P. Pirie, 226 †, 322 §
Kauwer oasis, Sahara, 243, 259
Keane, A. H., Bernard's "La Pénétration Saharienne," 79 §; Reinhardt's "Mensch zur Eiszeit in Europa," 83 §; Stanford's Compendium of Geography and Travel: Southern and Western Asia, 613 †, 711 §
Keda, Malay States, 478, 484
Keeling, B. F. E., Upper Air investigations in Egypt, 508 †; Upper Air research at Helwan Observatory, 103 †
Kelantan, Malay States, 478
Keller, H., Speisung des Rheins aus dem Alpen- und Mittelgebirgslande bei Niedrigwasser, 505 †
Kemp, J. F., Buried Channels beneath the Hudson and its Tributaries; 508 †
Kendall, P. F., and E. B. Bailey, Glaciation of East Lothian, 339 †
Kent—
Cambridge County Geographies. Kent: G. F. Bosworth, 727 †
Rainfall of: H. R. Mill, 591
Kentucky—
Coal resources of Russell Fork Basin in Kentucky and Virginia: R. W. Stone, 342 †
Kerguelen—
Archipel de Kerguelen et les autres îles australes françaises: G. Richard, 617 †
Keria river, Tibet, 313
Kettle, W. R., Supplement to . . . Findlay's Sailing Directory for North Pacific Ocean and Japan, 510 †
Keyes, C. R., Geotectonics of Estancia Plains, 342 †
Khartoum—
Wellcome Research Laboratories at Gordon Memorial College, Third Report: A. Balfour, 616 †
Kiepert, H., Generalkarte der Südost-Europäischen Halbinsel, 109 †
Kiepert, R., Formæ Orbis Antiqui, 114 †
Kilroe, J. R., Occurrence and origin of laterite and bauxite in the Vogelsberg, 504 †
Kinangop—
Ascensione sul Kinangòp nell' Africa equatoriale: F. Perlo, 91 §, 103 †
King Frederick VIII. Land, Greenland, 52
King's Highway: R. Ryves, 210 §
Kingston-upon-Hull, and Port of Hull, Notes on Origin of: J. Travis-Cook, 713 §
Kioga or Ibrahim lake, Sudan, 90; Exploratory Survey, 1907–1908: C. E. Fishbourne, 192 *
Kirkland, C., Some African Highways, 228 †, 323 §
Kiu-Kenik valley, Central Asia, 281
Knapp, C., M. Borel und V. Attinger, Geographisches Lexikon der Schweiz, 339 †
Knörzer, A., Ueber die Temperaturverhältnisse der oberrheinischen Tiefebene, 504 †
Knott, C. G., Physics of earthquake phenomena, 107 †
Knox, A., Isohyets 'twixt Sahara and Western Sudan, 697 *
Koch-Grünberg, T., Zwei Jahre unter den Indianern; Reisen in Nordwest-Brasilien, 105 †
Koebel, W. H., Madeira Old and New, 713 §, 730 †
Koh-i-Taftan volcano, Persia, 212
Kohlschütter, E., Method of Plan of Sea Waves, 576
Koldewey, C. C. (biography): E. Herrmann und Prof. v. Hasenkampf, 346 †
Komaroff, M., Botanical expedition to Kamchatka, 719
Konorowicz, M. von, Quer durch Island, 612 †
König, F., Vertrocknungsprozess der Erde, 618 †
Köppen, W., Ueber die Schreibung geographischer Namen, 511 †
Kordofan—
History of Kordofan before Egyptian conquest, Notes on: H. A. MacMichael, 508 †
Korea—
In Korea with Marquis Ito: G. T. Ladd, 85 §
Trade of Corea, Report for 1907 (Consular Reports), 227 †
Wahrhaftige Beschreibungen dreyer mächtigen Kgr. Japan, Siam, und Corea: C. Arnold and others, 107 †
Koryak: Material culture and social organization: W. Jochelson, 507 †
Kossmat, F., Paläogeographie (Geologische Geschichte der Meere und Festländer), 619 †
Kota Bharu, Kelantan, 480
Kozloff, P. K., Mongolia and Kam, 340 †
Kôzu, S., Volcano Ontake, 227 †
Krakatau—
Flora, new, of volcanic island of Krakatau: A. Ernst, 227 †
Krämer, A., Studienreise nach den Zentral- und Westkarolinen, 217 §, 343 †

Kromayer, J., Austrian Expedition for Investigation of Battlefields of Second Punic War, 496
Kuala, Trengganu, Malay peninsula, 482
Kubi-tsangpo, Tibet, 409
Kühnen, F., Hydrostatische Höhenvergleichungen von 4 Festpunkt en auf dem Telegraphenberge bei Potsdam, 504 †
Kukawa, rainfall at, 701
Kungess river, Central Asia, 279
Kürchhoff, D., Alte und neue Handelsstrassen in Ost-Afrika, 615 †; Sandfloh in Afrika, 615 †
Kurz, W., Beurteilung der Aussichten auf eine Wiederbelebung der Kultur der Euphrat- und Tigrisniederung, 507 †
Kuzupchi sands, Ordos country, 671
Kwania, Lake, Uganda protectorate, 195

L.

Labrador—
Along the Labrador Coast: C. W. Townsend, 230 †, 592 §
Boundary question: Archbishop Howley, 229 †, 331 §
Early voyages to, 74
Labrang monastery, Tibet, 89
Lacoste, H. de B. de, Around Afghanistan, 727 †; Autour de l'Afghanistan, 101 †, 615 †
Lacroix, A., Montagne Pelée après ses éruptions, 733 †
Lacroix, N.: *see* Bernard, A.
Lacy, W. N., Some climatic influences in American history, 508 †
Ladd, G. T, In Korea with Marquis Ito, 85 §
Laflamme, J.-C. K., Tremblements de terre de la région de Quebec, 229 †
Lakes—
Freezing of fresh-water lakes: E. M. Wedderburn, 219 §, 344 †
Sounding machine, Note on a new: E. J. Garwood, 510 †
Lakor-tso, Tibet, 385
Lal Singh, Rai Sahib, R.G.S. award to, 594, 610
Lammens, P. H., Notes de géographie syrienne, 729 †
Lamothe, R. de, Note sur la géologie du Cambodge et du Bas-Laos, 614 †
Lampe, F., Zur Einführung in den erdkundlichen Unterricht an mittleren und höheren Schulen, 234 †
Lau-Chou district, China, 89
Landes—
Sables marins de la côte landaise: Saint-Jours, 504 †
Landor, H. S., on hydrography of Lake Manasarowar, 410
Landslides—
Terres coulantes, Note sur les: A. Grégoire, 344 †
Lang, J., Outposts of Empire, 324 §
Langak-tso, Tibet, 402
Langchen river, Tibet, 401
Lantenois, H., Note sur la géologie de l'Indo-Chine, 614 †; and others, Résultats de la mission géologique et minière du Yunnan méridional, 614 †
Laos—
Geologie du Cambodge et du Bas-Laos: R. de Lamothe, 614 †
Lapchung country, Tibet, 382
Lapland—
Gletscherenden und die Schwankungen der Sarcker Gletscher in Schwedisch-Lappland: A. Hamberg, 505 †
Lapp migrations between Sweden and Norway: K. B. Wicklund, 210
Larden, W., Guide to Walks and Climbs round Arolla, 84 §
Larrabure i Correa, C., Colleccion de leyes . . . documentos officiales referentes al Departamento de Loreto, 231 †
Larras, N., Cartes de reconnaissance du Maroc, 237 †, 348 †, 514 †, 624 †
Latham, B., remarks on "Geographical Distribution of Mean Annual Rainfall of Wales and Monmouthshire," 308
Latitude—
Determinacion de la hora y de la latitud jeografica: A. Obrecht, 343 †
Variation, 579
Lauterer, J., Mexico, das Land der blühenden Agave, 201 §
Lebedeff, W. N., Seengebiet am östlichen Abhange des Ural, 505 †
Le Blond, A., Mountaineering in Land of the Midnight Sun, 225 †, 320 §
Lees, G. R., Witness of the Wilderness, 592 §, 615 †
Leffingwell, E. de K., Exploration in North-West America, 215
Legendre, A. F., Explorations in Western Sechuan, 327
Legge, W. V., An investigation into physiography of Ben Lomond Plateau, Tasmania, 232 †
Leguizamón, M., Guia de Forasteros del Virreinato de Buenos Aires, 617 †
Lehmann-Nitsche, R., Estudios antropologicos sobré los Chiriguanos, etc., 617 †
Leland, J., Itinerary of: Lucy T. Smith, 591 §, 613 †
Lemoine, P., Snow on the Western Atlas, 498
Lenfant, E., Découverte des grandes sources du centre de l'Afrique, 228 †, 616 †
Lenje handbook: A. C. Madan, 229 †
Lenox-Conyngham, G. P., remarks on "Discoveries in Southern Tibet," 427
Leonardo da Vinci and the Art of the Renaissance in its relations to Geography: E. Oberhummer, 540 *
Lepsius, R., Bericht über die 25 jahrige Tätigkeit der Grossh. Hessischen geologischen Landesanstalt zu Darmstadt, 504 †

Leroy-Beaulieu, P., De la Colonisation chez les Peuples Modernes, 84 §
L'Estrange, P. H., Philips' Geographical Pictures, 712 †
Lett, S. J., More about Zambesia Minerals, 341 †
Levainville, J., Le Morvan; étude de géographie humaine, 726 †; Toponymie morvandelle, 100
Levantine Riviera: W. T. Beeby and E. Reynolds-Ball, 225 †, 321 §
Lewin, H. B., Exploration of Caves in Western Uganda, 599
Linde, R., Die Niederelbe, 100 †
Lindeman, Moritz (biography): W. Wolkenhauer, 511 †
Literary and biographical studies: J. Baker, 235 †
Little, C., Note on calm region in atmosphere above Calcutta, 614 †
Liverpool bay, Chart of: H. Belam, 516 †
Lobor mountains, Uganda Protectorate, 193
Loch, Catharine G., Memoir: A. F. Bradshaw, 234 †
Lodge, R. B., Bird-hunting through wild Europe, 225 †, 321 §
Lœfler, —, Régions comprises entre la Haute-Sanga, le Chari et le Cameroun, 508 †
Logan, Sir W. E., and the Geological Survey of Canada: R. Bell, 511 †
Loir, A., Canada et Canadiens, 104 †, 323 §
Loma de la Tina, Santo Domingo, 652
London—
  Maps: Combined maps of London and 25 miles round: H. Grube, 110 †; Hollar's "Exact Surveigh of Streets, Lanes and Churches contained within Ruines of City of London," 110 †; New Map of Metropolitan Railways, etc.: E. Stanford, 623 †
  Memorials of Old London: P. H. Ditchfield, 226 †, 312 §
  Morden and Lea's plan of London, 1682: W. S. Spiers, 727 †
  Port of London Bill, Report of Committee, 339 †
Longhena, M., Appunti di storia della cartografia seguiti dal periplo dell' Italia desunto da 11 mappe, 620 †
Longstaff, F. V., Photographs of Scotland, 740 †
Longstaff, T. G., Expedition to Himalayas, 88; letter on the Trans-Himalayan range, 97; photographs of Kumaon and Manasarowar region of Tibet, 351 †; remarks on "Discoveries in Southern Tibet," 424
Lorenz, T., Ueber den Gebirgsbau Mitteldeutschlands, 612 †
Loreto—
  Colleccion de leyes . . . documentos officiales referentes al Departamento de Loreto: C. Larrabure i Correa, 231 †
Lorin, H., Afrique du Nord, 229 †, 708 §
Lo-shan range, 674
Loud, F. H., Comparison of temperatures between Colorado springs and Lake Moraine, 731 †
Louis-Jaray, G., La géographie nouvelle, 621 †
Lovell, W. H., Plane-table and its use in surveying, 233 †
Löwl, F., Geologie, 619 †
Lucas, A., Chemistry of River Nile, 103 †
Lucas, Sir C. P., History of Canada, 1763-1812..730 †
Ludwig Salvator, Duke, Warum die Nordseite der Mittelmeerinseln die mildere ist, 505 †
Lu-guan-lin or Bo-yui-shan range, 673, 674
Luk-chun, Meteorological observations at, 717
Lunar, The New, and its limits of accuracy: H. B. Goodwin, 509 †
Luristan province, Earthquake in, 296
Luzon—
  Ethnographie von Noord-Luzon: H. Fehlinger, 507 †
  Map: Macayan-Suyoc, Lepanto Province, 514 †
Lyde, L. W., School Text-book of Geography, 208 §
Lyons, H. G., Cadastral Survey of Egypt, 1892-1907..729 †; Earth-movements round Victoria Nyanza, 328, 730 †; Report on Works of Survey Department, Egypt, 103 †, 314 §

M.

Maarid, ruined castle, El Jauf, 530
Macalister, D. A., Geological aspect of lodes of Cornwall, 339 †
McClintock, Sir L., Life of: Sir C. Markham, 709 §
Macdonald, W., Agricultural potentialities of the Transvaal, 730 †
Macedonia—
  Geographie und Geologie von Mazedonien und Altserbien, Grundlinien der: J. Cvijić, 99 †
  Mineralquellen Makedoniens: F. Baron Nopcsa, 505 †
Macey, P., Cours d'eau souterrains du Cammon au Laos, 614 †
MacGregor, Sir W., Report by Governor on visit to Miemac Indians at Bay D'Espoir, 230 †
Mackay, D., Expedition in British New Guinea, 93
Mackellar, C. D., Pleasure pilgrim in South America, 342 †, 593 §
Mackenzie—
  Through the Mackenzie Basin: C. Mair, 586 §
Mackinder, H. J., Geographical Conditions affecting British Empire. I. British Islands, 462 *; Lands beyond the Channel, 99 †, 318 §; remarks on "Panama Canal in 1908," 179
Maclaren, J. M., Gold: its geological

occurrence and geographical distribution, 620 †
Maclear, J. P., Alaska and Bering Sea Pilot, 104 †
MacMichael, H. A., Notes on history of Kordofan before Egyptian conquest, 508 †
MacNair, P., Geology and Scenery of Grampians and Valley of Strathmore, 579 §
MacNutt, F. A., Letters of Cortés, 80 §
Macpherson, W. G., Some practical points in prevention of disease in Panama and Cuba, 231 †
Madagascar—
Européens et Malgaches: G. Grandidier, 341 †
Neufans à Madagascar: Gen. Gallieni, 581 §, 616 †
Madan, A. C., Lenje handbook, 229 †
Madeira, Old and New: W. H. Koebel, 713 §, 730 †
Madrolle, M., Journeys in Hainan, 718
Magellan, Strait of—
Derrotero del Estrecho de Magallanes i aguas adyacentes: B. Pacheco, 509 †
Magellanic Expedition, Swedish, 1907–09: C. Skottsberg, 289 *
Magnetic pole, South, location of, 488
Mahableshwar Plateau (Map): F. J. Varley, 111 †
Maillet, E., Sur une loi hydrologique de Minard et Belgrand, 344 †
Mair, C., Through the Mackenzie Basin, 586 §
Maitland, A. G., Geological Features and Mineral Resources of Pilbara Goldfield, 618 †
Majorca—
Story of Majorca and Minorca: Sir C. Markham, 101 †, 581 §
Malay Peninsula—
Cinquante histoires d'Extreme-Orient, mises en français, d'après les textes malais: A. Mersier, 728 †
Malay States—
British-protected Malay States—Kelantan, Trengganu, and Keda, 478
Maps: Negri Sembilan: W. A. Wallace and A. E. Young, 623 †
Trigonometrical and General Survey Department, Report for 1906: A. E. Young, 227 †
Malemuk mountain, Greenland, 46
Man (*see also* Anthropogeography)—
Man and climatic change in South America: I. Bowman, 267 *, 602 †
Mensch zur Eiszeit in Europa: L. Reinhardt, 83 §
Manaos, Rio Negro, 608
Manasarowar lake: Hydrography, Problem of, 409, 410; Photographs: T. G. Longstaff, 351 †
Manenguba range, West Africa, 90
Mangin, G., work in French Sudan, 90
Mann, W. W., Esperanto self-taught, with phonetic pronunciation, 234 †
Mansfeld, A., Urwald-Dokumente: vier Jahre unter den Crossflussnegern Kameruns, 229 †
Manson, Sir P., Tropical research in its relation to Missionary Enterprise, 345 †
Mapa Mundi: San Isidoro de Sevilla, A. Blásquez y D. Aguilera, 734 †
Maps (Cartography)—
1:1,000,000 map, Progress of, 577
Aeronauts, Special maps for: H. Moedebeck, 218
Comparative Series of Outline Physical Maps: G. Philip & Son, 625 †
"Diagram" Hand-maps: B. B. Dickinson and A. W. Andrews, 114 †
Dürer's Map of World, 562
Glareanus, Maps of: C. R. James, 345 †
Legibility of Modern Maps, 577
Leonardo da Vinci's work as a cartographer, 543
Maps and Map-making, Special lectures on: E. A. Reeves, 502
Orographical maps and geographical lessons: A. J. Herbertson, 346 †
Maps, New—
Africa, 113, 237, 348, 514, 624, 736
America, 113, 237, 349, 514, 624, 736
Asia, 110, 237, 347, 514, 623, 736
Australasia and Pacific Islands, 114, 515
Europe, 109, 235, 346, 511, 621, 735
General, 114, 214, 349, 515, 625, 737
Polar Regions, 625
Marcel, G., Le père Yves d'Évreux, 331 §, 510 †; obituary, 606
Marco Polo's travels; new editions: A. Houtum-Schindler, 734 †
Mares, D. J., Australian Weather, 105 †
Marine World Chart of Nicolo de Canerio Januensis 1502: E. L. Stevenson, 683 §
Marinelli, O., Osservazioni morfologiche nell' alta Ossola, 613 †
Mariner of England: S. Childers, 86 §
Marini, L., Intorno alle basi per lo studio della circolazione marina, 733 †
Mariti, G., Travels in Island of Cyprus, translated by C. D. Cobham, 728 †
Markham, Sir A., remarks on "Proposed North Polar Expedition," 459
Markham, Sir C. R., Life of Admiral Sir L. McClintock, 709 §; Nasamonians: a call to exploration, 621 †; remarks on: "Danish North-East Greenland Expedition," 62; "Discoveries in Southern Tibet," 416; "Proposed North Polar Expedition," 458; "River Paraná: an Economic Survey," 37; Story of Majorca and Minorca, 101 †, 581 §
Markham river, New Guinea, 333
Marquardson, H., Niger-Benué, 730 †
Marshall, H. E., Our Empire Story, 107 †, 324 §
Marshall islands—
Native Chart from the Marshall Islands in British Museum, Note on: T. A. Joyce, 105 †

Marshall, P., Geology of centre and north of North Island (New Zealand), 509 †
Marsters, V. F., Dos informes sobre los valles de Ilo, Moquegua ó Ica, 732 †
Martel, E.-A. (*see also* Molard), Côte d'azur russe (Riviera du Caucase), 227 †
Martin, C., Landeskunde von Chile, 731 †
Martin, E. A., Some considerations concerning dew-ponds, 618 †
Martin, G. C., Geology and Mineral Resources of Controller Bay region, Alaska, 229 †
Martinique—
Ten days in camp on Mount Pelé: E. O. Hovey, 732 †
Maryland—
Bushey Cavern, Exploration of: C. Peabody, 731 †
Geological Survey. Vol. 6..508 †
Weather Service. Vol. 2..508 †
Masson, L. R., Bourgeois de la Compagnie du Nord-Ouest, 108 †
Matthes, F. E.: *see* Johnson, D. W.
Mattos, J. N. B., O Serviço Meteorologico e o Clima do Estado de S. Paulo, 105 †
Maunsell, F. R., remarks on "Baghdad to Damascus *viâ* El Jauf," 534
Mauritius—
Magnetical . . . Observations made at Royal Alfred Observatory in 1905 and 1906: T. F. Claxton, 341 †, 508 †
Malaria in Mauritius, Report on prevention of: R. Ross, 229 †
Photographs of Mauritius, 628 †
Royal Alfred Observatory, Annual Report: T. F. Claxton, 341 †
Mauwe lake, Kamerun, 328
Mazelle, E., Klimatographie de österreichischen Küstenlandes, 611 †
Meakin, A. M. B., Galicia, the Switzerland of Spain, 713 §, 726 †
Mecklenburg—
Brunnenbohrungen in Mecklenburgh Ergebnisse der: E. Geinitz, 612 †
Mediterranean—
Mediterranean Pilot. Vol. 4..225 †
Submarine eruptions, observations by H. S. Washington, 722
Warum die Nordseite der Mittelmeerinseln die mildere ist: Erzherzog Ludwig Salvator, 505 †
Meiklejohn's Series of Oroscopic Maps. No. 1, South America, 515 †
Mela, P., Geographie Afrikas bei Plinius und Mela und ihre Quellen: D. Detlefsen, 598 §, 615 §
Melanesia—
Percy Sladen Trust Expedition to Melanesia: A. C. Haddon, 105 †
Mellor, E. T.: *see* Trevor, J. G.
Melvill, J. C., and R. Standen, Marine Mollusca of Scottish National Antarctic Expedition, 106 †
Mende language: F. W. Migeod, 229 †
Mercalli, G., Vulcani attivi della Terra, 310 §
Meroe—
Ruins of: A. H. Sayce, 327
Mersier, A., Cinquante histoires d'Extreme-Orient, mises en français, d'après les textes malais, 728 †
Merzbacher, G., Exploration in Tian Shan Mountains, 278 *
Messina, Earthquake at, 295
Meteorology—
Anticyclonic belt of southern hemisphere: H. E. Rawson, 344 †
Dawn of Meteorology: G. Hellmann, 510 †
Eastward circulation of our atmosphere, Explanation of cause of: J. M. Schaeberle, 344 †
International Meteorological Committee, Paris, Report of eighth meeting, 619 †
Manual de Meteorología práctica: R. Amengual, 233 †
Meteorological Observations at stations of second order for 1904..506 †
Meteorologie und Klimatologie: W. Trabert, 619 †
Métin, A., Colombie britannique, 201 §, 616 †
Meuse—
Vallée lorraine de la Meuse, Etude sur la: J. Vidal de la Blache, 100 †
Mexico—
Camp-fires on desert and lava: W. T. Hornaday, 230 †, 323 §
Coronado's Route through Northern Mexico and Arizona: S. Potter, 91
Indian Mexico, In: F. Starr, 616 †
Letters of Cortés: F. A. MacNutt, 80 §
Mexico, das Land der blühenden Agave: J. Lauterer, 201 §
Photographs of Mexico: H. Wallach, 739 †
Through Southern Mexico: H. Gadow, 104 †, 587 §
Travels in: G. T. Vigne, 109 †
Vulkanen Mexikos, Beobachtungen an einigen: A. Dauneberg, 731 †
Wirtschaftsgeographie von Mexico: K. Sapper, 201 §
Meyer, H., In the High Andes of Ecuador, 82 §
Michel, G., Contribution à l'étude des cours d'eau du plateau fribourgeois, 727 †
Michigan—
Water plans of extinct glacial lakes in Lake Michigan basin, Reconstruction of: J. W. Goldthwait, 342 †
Michow, H.: *see* Grigorief, A. W.
Micmac Indians, Newfoundland, Report on visit to the: Sir W. Macgregor, 230 †, 332 §
Microbarograph—
Theory of leaking microbarograph, etc.: G. Chrystal, 620 †
Miege, G., Relation of three Embassies from His Sacred Majestie Charles III. to the Great Duke of Muscovie, etc., 108 †

Migeod, F. W., Mende language, 229 †
Mikkelsen, E., Conquering the Arctic Ice, 493 §, 618 †; Expedition to East Greenland, 603
Mill, H. R., Definition of word "geography," 573; Lieut. Shackleton's achievement, 569*; Rainfall of Kent, 594; remarks on: "Geographical Distribution of Mean Annual Rainfall of Wales and Monmouthshire," 305; "Isohyets 'twixt Sahara and Western Sudan," 703; "Proposed North Polar Expedition," 461
Millar, W. J., Glacial phenomena in Bute, 506 †
Millosevich, E., Italia nel problema degli spostamenta del polo sul geoide, 619 †
Min river, Botanical Explorations by S. T. Dunn in district of, 213
Minorca—
  Story of Majorca and Minorca: Sir C. Markham, 101 †, 581 §
Misda, Tripoli, 248
Misiones territory, Argentine, 10
Mississippi—
  Expedition through Upper Mississippi to Itasca lake: H. R. Schoolcraft, 109 †
  River Problem: W. S. Tower, 342 †
Missouri—
  Missouri river and its Future Importance to Nations of Europe: L. A. Owen, 509 †
Moedebeck, H., Special Maps for Aeronauts, 218
Mohn, H., Einige Bemerkungen über den Einfluss der Erdrotation auf die Meeresströmungen, 510 †
Molard, —, et Martel, E.-A., Grottes de Sabart, 612 †
Monaco, Prince A. de, Résultats des campagnes scientifiques accomplies sur son yacht, 733 †
Mongolia—
  Mongolia and Kam. Works of Imperial Russian Geographical Society's Expedition: P. K. Kozloff, 340 †
Mongols, a History: J. Curtin, 320 §
Monmouthshire—
  Rainfall, Mean annual, 297
Monroe, W. S., In Viking Land, 591 §, 613 †
Montauzan, C. G. de, Rapport sur une mission scientifique en Italie et en Tunisie, 726 †
Montenegro—
  Maps: Generalkarte von Serbien und Montenegro: K. Peucker, 622 †
Montessus de Ballore, F., Variations de latitude et tremblements de terre, 510 †
Montgomerie's explorations and journeys in Trans-Himalaya, 403, 404
Montpellier—
  Ethnographiques et geologiques sur les environs de Montpellier, Considérations: C. Fernand, 100 †
Moon, Mountains of the, Tramps round the: T. B. Johnson, 85 §
Moritz, E., Entwickelung des Kartenbildes der Nord- und Ostseeländer bis auf Mercator, mit besonderer Berücksichtigung Deutschlands, 211, 505 †
Morley of Blackburn, Lord, remarks on "Journeys in Tibet, 1906-1908," 393
Morocco—
  Beni-Snassen (Maroc): A. Brives, 341 †
  Chaouia, Les: F. Weisgerber, 508 †
  Etude sociale, politique et Economique sur le Maroc: G. Jeannot, 103†, 583 §
  In Morocco with General d'Amade: R. Rankin, 103 †, 210 §
  Maps: Cartes de reconnaissance du Maroc: N. Larras, 237 †, 348 †, 514 †, 624 †; Carte du Maroc (Service Géo. de l'Armée), 624 †; Hydrographic Charts (Mission Hyd. au Maroc), 350 †
Morris, Sir W. G., and H. W. Gordon, Reports on Geodetic Survey of Transvaal, O.R.C., and Rhodesia, 314 §
Morrison, Mount, Formosa, 497
Morse, H. B., Trade and administration of Chinese Empire, 614 †
Morvan—
  Étude de géographie humaine: J. Levainville, 726 †
  Toponymie morvandelle: M. Levainville, 100 †
Moselle—
  Canalization of the Moselle and Sarre: B. Auerbach, 211
Mozambique—
  Trois années de chasse au Mozambique: G. Vasse, 508 †
Müller, J. C., der österreichische Topograph, und die vaterländische Kartographie: K. Peucker, 339 †
Mun-tso, Tibet, 366
Murdoch, W. G. B., From Edinburgh to India and Burmah, 85 §
Murray, A. C., and R. Cannon, Map of Orange River Colony, 113 †
Murray, Sir J., remarks on "A Proposed North Polar Expedition," 460; and L. Pullar, Bathymetrical Survey of Freshwater Lochs of Scotland, 613 †; und E. Philippi, Grundproben der "Deutschen Tiefsee Expedition," 620 †
Murray river—
  Bassin du Murray, Question de l'eau dans le: P. Privat-Deschanel, 105 †
Murzuk, Sahara, 243
Musoni, F., Sedi umane nel bacino medio del Natisone (Friuli), 726 †

N.

Nain Singh's journeys and discoveries in Tibet, 402
Naivasha lake, East Africa, 129
Namaland—
  Reisestudien in Gross-Namaland: P. Range, 729 †
Nam-tso, Tibet, 361
Nandarua or Kinangop mountain, East Africa, 91

Nandi, their language and folk-lore: A. P. Hollis, 615 †
Nansen, F., remarks on "A proposed North Polar Expedition," 457
Nasamonians, a call to exploration: Sir C. Markham, 621 †
Natisone—
Sedi umane nel bacino medio del Natisone (Friuli): F. Musoni, 726 †
Natural Monuments, Care of: H. Conwentz, 590 §
Navassa, Haiti, 653
Navigation—
Arte of Navigation: M. Cortes, 108 †
New lunar and its limits of accuracy: H. B. Goodwin, 509 †
Ndu lake, Kamerun, 328
Négrin, F. de, Aux Picos de Europa (Asturies), 199 §
Negri Sembilan—
Map of: W. A. Wallace and A. E. Young, 623 †
Nerpichye, Lake, Kamchatka, 719
Ness, Loch, temperature of, 715
Nettancourt-Vaubecourt, J. de, Sur les grandes routes de l'Asie Mineure, 102 †
New Brunswick—
Boundaries between Canada and New Brunswick, Papers relative to settlement of (1851), 109 †
Geology and mineral resources of New Brunswick: R. W. Ells, 616 †
New England—
Marshlands on Coast of New England, Origin and Development of: D. P. Penhallow, 342 †
Newfoundland—
Micmac Indians at Bay d'Espoir, Report by Governor on visit to: Sir W. Macgregor, 230 †, 332 §
New Guinea—
British: Expedition under D. Mackay, 93; Naturalist's trip to New Guinea: C. B. Horsbrugh, 617; Papua: Annual Report for 1907..105 †
Dutch: Expedition to interior, under leadership of W. Goodfellow, 93; Further Notes on: T. Barbour, 105 †; Verrichtingen van het Militaire Exploratie-Detachement op Zuid Nieuw-Guinea: R. L. H. Hellwig, 105 †; Zuidwest Nieuw-Guinea-Expeditie 1904–5 van het Kon. Ned. Aardrijkskundig Genootschap, 202 §
German: Dammköhler-Fröhlich Expedition, 333; Durch das Innere von Kaiser-Wilhelmsland: O. Fröhlich, 333 §, 343 †; Phonographischen Aufnahmen in Neu-Guinea, Zweiter Bericht über meine: R. Pöch, 343 †
Waria-Expedition, 105 †
New Mecklenburg—
Orientierungsmärsche an der Ostküste von Süd-Neu-Mecklenburg: O. Schlaginhaufen, 509 †
New Mexico—
Volcanic necks of Mount Taylor region: D. W. Johnson, 731 †
New South Wales—
Coastal winds, Peculiarities in, and their influence upon abundance of fish in inshore waters: H. C. Dannevig, 105 †
Fishes, Edible, of New South Wales: D. G. Stead, 231 †
Geology and Mineral Resources of Western Coalfield: J. E. Carne, 105 †
New York—
Maps: Indexed County and Railroad Pocket Map, etc., of New York (Rand, McNally & Co.), 625 †; New Handy Map of New York City (Rand, McNally & Co.), 625 †
New Zealand—
Geology of centre and north of North Island: P. Marshall, 509 †
Geology of Coromandel subdivision: C. Fraser and J. H. Adams, 106 †
Geology of Cromwell subdivision: J. Park, 106 †
Glaciers . . . in South Island of New Zealand: C. D. Fox, 509 †
Neuseeland nach seiner Geschichte und seiner natur: M. F. Blasneck, 618 †
Photographs of New Zealand and Tasmania, 739 †
Romance of Empire; New Zealand: R. Horsley, 106 †, 324 §
Survey Operations of Dept. of Lands, Report for 1907–8: T. Humphries, 232 †
Terrace-development in Valleys of Canterbury Rivers, Some Aspects of: R. Speight, 509 †, 721 §
Vegetation of Mount Hector: D. Petrie, 602
Ngami, Lake, Desiccation of, 601
Nganglaring-tso, Tibet, 385
Niagara—
Age of Niagara Falls, Side issues bearing on: J. W. Spencer, 508 †
Diversion of Water from Niagara and its Effects: J. W. Spencer, 601
Falls of Niagara, Spoliation of: J. W Spencer, 731 †
Nicobars—
Local Gazetteer: Andaman and Nicobar Islands, 728 †
Nien-chen-tang-la, Tibet, 361
Niger—
Dakar au Niger, De: F. Riembau, 616 †
Gao, Region of, journey by F. Dubois, 720
Rainfall of Niger Bend region, 698
Nigeria—
Niger-Benué, eine historisch-geographische Beschreibung der Natürlichen Verbindung Nord-Kameruns mit der Küste: H. Marquardsen, 730 †
Northern, Photographs: V. Cruz, 240 †: fforde Scaright, 240 †

Nigeria—*continued.*
Southern, Forest Administration in (Colonial Reports), 215 §
Nile—
Chemistry of River Nile: A. Lucas, 103 †
Fifty Years of Nile Exploration and some of its results: Sir W. Garstin, 117 *
Physiography of Nile, 577
Relation between Nile floods and atmospheric pressure: J. J. Craig, 508 †
Rise and discharge, 140
Sudd blocks in the Nile, 138
Victoria Nile, Discovery of, 126
White Nile, An unlocated tribe on: B. Struck, 616 †; marshes of, 137
Nopcsa, Baron F., Mineralquellen Makedoniens, 505 †
Nordenskjöld, O., On Geology and Physical Geography of East Greenland, 106 †; Wissenschaftliche Ergebnisse der schwedischen Südpolar-Expedition, 1901–1903..732 †
Nordlander, J., Minnen af heden tro och kult i norrländiska ortnamen, 226 †
Norman, A. M., Podosomata of temperate Atlantic and Arctic Oceans, 344 †
Normandy—
Normandie et les Normands: Revel, 100 †
Paysans de la Normandie orientale: J. Sion, 672 †
Norrland—
Minnen af heden tro och kult i norrländiska ortnamen: J. Nordlander, 226 †
North Pole: *see* Arctic
North Sea—
Oceanographical observations, 70
North-West Passage, Early attempts of the, 72
Norway—
Lapp Migrations into Norway, 210
Man in West Norway: M. Jefferson, 726 †
Maps: Kystkarter (Norges Geografiske Opmaaling), 626 †; Topografisk Kart over Kongeriget Norge, 623 †
Mountaineering in Land of the Midnight Sun: A. Le Blond, 225 †, 320 §
Växtgeografiska anteckningar från ett par färder genom Skibottendalen i Tromsö amt: A. Heintze, 505 †
Viking Land, In: W. S. Monroe, 591 †, 613 †
Nova Scotia—
Explorations in Nova Scotia, 1907, Summary Report on: H. Fletcher, 730 †
Maps: Plans and sections of gold districts (Geol. Survey, Ottawa), 113 †; Province of Nova Scotia to illustrate report by E. R. Faribault on "Gold Fields of Nova Scotia" (Geol. Survey, Ottawa), 114 †
Novaya Zemlya—
Expedition to, C. Bénard's, 94
Scientific work of K. E. von Baer, 724
Novibazar—
Bedeutung des Sandshak Nozipazar: E. Schultze, 727 †
Novosiltzof, A., Bolshezemelsk Tundra and the Arctic Ocean, 505 †
Nuwara Eliya, Ceylon, Map of Town of, (Surveyor-General), 736 †
Nyasaland—
Photographs: W. C. Piercy, 352 †

O.

Oaten, E. F., European Travels in India, 714 §
Ober, F. A., Guide to West Indies and Bermudas, 231 †, 593 §
Oberhummer, E., Leonardo da Vinci and Art of the Renaissance in its Relation to Geography, 540 *
Obermaier, H., Steingeräte des französischen Altpälaolithikums, 100 †
Obrecht, A., Determinacion de la hora y de la latitud jeografica, etc., 343 †
Observatories—
Royal Observatories of Paris and Greenwich, Account of mode . . . for determining relative situation of: W. Roy, 109 †
Oceanography—
Campagne scientifique de la *Princesse Alice* (1908) Liste des Stations, 733 †
Campagnes scientifiques accomplies sur son yacht, Resultats des: A. Prince de Monaco, 733 †
Conditions of life in the sea: J. Johnstone, 107 †
Currents: Bemerkungen über die durch den Wind erzeugten Meeresströmungen: O. E. Schiötz, 510 †; Circolazione marina, Intorno alle basi per lo studio della: L. Marini, 733 †; Einfluss der Erdrotation auf die Meeresströmungen: H. Mohn, 510 †; Meeresströmungen: O. Pettersen, 510 †; Tidal wave and currents, 451
Deposits: Grundproben der Deutschen Tiefsee Expedition: Sir J. Murray and E. Philippi, 620 †
Internationalen Meeresforschung, Die beteiligung Deutschlands an der. IV.–V. Jahresbericht, erstattet von dem Vorsitzenden der Wissenschaftlichen Kommission: W. Herwig, 107 †
Lijeros Apuntes sobre oceanografía: R. Amengual, 233 †
Tiefsee- und Hochluft-Forschungen an Bord S.M.S. *Planet*: W. Brennecke, 344 †
Okhotsk sea—
Sea of Okhotsk and Coast of Kamtchatka: Y. Suzuki, 340 †
Oldham, R. D., Italian Earthquake of December 28, 1908..185 *; Recent Earthquakes, 294 *

Oldmixon, J., British Empire in America, 108 †
Oliver, S. P., Life of Philibert Commerson, 714 §
Ollone, H. d', Expedition in China, 89, 327
Ommanney, R., R.G.S. award to, 594, 610
Omond, R. T., Range of monthly mean temperature at Edinburgh, Vienna, and Stockholm, 504 †
Omori, F., Earthquake sound, 733 †; Earthquake studies in Japan, 723; on average period of severe earthquakes in Japan, 227 †
Oppokov, E. V., Méthode simple servant à l'étude du régime des fleuves pendant plusieurs années et son application au bassin du Dnĕpr, 733 †
Oran—
  Carte géologique d'Oran, Notice explicative de la: — Doumergue et E. Ficheur, 615 †
Orange River Colony—
  Maps: Orange River Colony: A. C. Murray and R. Cannon, 113 †
Ordnance Survey Maps of England and Wales, † 109, 236, 347, 512, 622, 735
Ordos, Problems in Exploration: W. R. Carles, 668 *
Oregon—
  Fur Hunters of the Far West: A. Ross, 108 †
  History of Oregon Territory, etc.: J. Dunn, 108 †
Oreodora regia, royal palm of Cuba, 630
Orkneys—
  Climate of Orkney: M. Spence, 324 §, 506 †
Orleans, Duke of, Revanche de la Banquise, 708 §, 732 †
Osmanen und Griechen, Windrose, bei: K. Foy und F. Giese, 734 †
Ostenfeld, C. H., Ecology and distribution of grasswrack in Danish waters, 503 †
Outes, F. F., Alfarerías del noroeste Argentino, 617 †; Arqueología de San Blas (Provincia de Buenos Aires), 617 †; Sobre el hallazgo de Alfarerías mexicanas en la provincia de Buenos Aires, 617 †
Owen, L. A., Missouri River and its Future Importance to Nations of Europe, 509 †
Owen, R. C., Bari grammar and vocabulary, 103 †
Oxford School of Geography, Report for 1908..500
Oxfordshire—
  Solution-valleys in Glyme area: E. C. Spicer, 506 †

P.

Pacheco, B., Derrotero del Estrecho de Magallanes i aguas adyacentes, 509 †
Pacific—
  Maps: Pilot Charts of North Pacific Ocean (U.S. Hydrographic Office), † 116, 239, 350, 516, 626, 738
  Most Explored and Least Known Region of the Globe: L. G. Blackman, 232 †
  Relations commerciales et maritimes entre la France et les côtes de l'Océan Pacifique: E. W. Dahlgren, 734 †
  Sailing Directory, Findlay's, for North Pacific Ocean and Japan, Supplement to: W. R. Kettle, 510 †
Palazzo, L., Sul rilevamento magnetico della Sardegna, 613 †
Palestine—
  Climate of Ancient Palestine: E. Huntington, 326, 729 †
  Maps: Karte von Ostjordanlandes: G. Schumacher, 347 †
Panama—
  Climatic variations, Progressive, on isthmus of Panama: H. L. Abbot, 509 †
  Cost of canal, 175, 176
  Disease in Panama and Cuba, Some practical points in prevention of: W. G. Macpherson, 231 †
  Geology of Isthmus of Panama: E. Howe, 231 †
  Health on Isthmus of Panama, letter from V. Cornish on, 609
  Panama canal and its builders: V. Cornish, 731 †
  Panama Canal in 1908: V. Cornish, 153 *
  Panamakanalfrage: F. Regel, 509 †
  Sanitation on Isthmus of, 154
Panggong lake, hydrographical problem of, 430
Pangkong lake, Tibet, 418
Papua: *see* New Guinea
Pax, F., Grundzüge der Pflanzenverbreitung in den Karpathen, 224 †
Pará—
  Trade of consular district of Pará, Report for 1907..104 †
Paraguay—
  Colonization in Paraguay valley, 30, 34
  Cuestión fronteriza con el Paraguay: B. Saavedra, 104 †
  Dans les hervaes: P. Walle, 732 †
  Extrañamiento de los Jesuitas del Rio de la Plata y de las Misiones del Paraguay: P. Hernández, 230 †
Paraguay river, South America, 1
Paraná River: An Economic Survey: W. S. Barclay, 1 *
Parana State, colonization in, 30
Paranacito valley, Argentine, 23
Park, J., Geology of Cromwell subdivision, New Zealand, 106 †; Textbook of theodolite surveying and levelling for use of students, 233 †
Parker, E., Highways and byways in Surrey, 321 §, 506 †
Partsch, J., Alaskas Bedeutung für die Gletscherforschung, 342 †

Passarge, S., Geschichte der Erforschung und Eroberung Kameruns, 341 †; Morphologische Skizze des Atlas zwischen Philippeville und Biskra, 341 †; Natürlichen Landschaften Afrikas, 228 †, 329 §
Patron, L. R., Antartida Americana, 618 †; Línea de frontera con la República Arjentina, 342 †
Peabody, C., Exploration of Bushey cavern, Maryland, 731 †
Pears, E., Bagdad Railway, 507 †
Peary, Arctic Club, Ten years of: H. L. Bridgman, 106 †
Peary Land, Greenland, 46, 52
Pector, D., Richesses de l'Amérique Centrale, 202 §
Peking—
  Maps: Plan de Pékin (Service Géo. de l'Armée), 623 †
Pelagosa island, climate of: J. Hann, 717
Pelée—
  Eruption of Pelée: A. Heilprin, 590 §
  Montagne Pelée après ses éruptions: A. Lacroix, 733 †
  Ten days in camp on Mount Pelé: E. O. Hovey, 732 †
Penck, A., Geographical comparison between Europe and North America, 604; und E. Brückner, Alpen im Eiszeitalter, 611 †
Penhallow, D. P., Origin and development of certain marshlands on coast of New England, 342 †
Pennell, T. L., Among wild tribes of Afghan frontier, 728 †
Perigny, Comte Maurice de, Yucatan inconnu, 731 †
Perkins, H. J.: *see* Harrison, J. B.
Perks, G. A., Zur Hydrographie des istrischen Karstes, 339 †
Perlo, F., Un ascensione sul Kinangòp nell' Africa equatoriale, 91 §, 103 †
Pernter, J. M., obituary, 607
Perret, F. A., Some conditions affecting volcanic eruptions, 345 †
Persia—
  Journal der reis van den gezant de B. I. Compagnie Joan Cunaeus naar Perzië in 1651-1652, door C. Speelman: A. Hotz, 614 †, 706 §
  Maps: Geologische Karte von Nordwest-Persien: A. F. Stahl, 348 †
  Perse d'aujourdhui; Iran, Mesopotamie: E. Aubin, 227 †, 322 §
  Renseignements à l'usage des Voyageurs et des résidents in Perse, 227 †
  Trade of provinces of Seistan and Kain, Report for 1907-08 (Consular Reports), 506 †
  Voyage, ou relation de l'état present du royaume de Perse: N. Sanson, 109 †
Persian Gulf—
  Geology of Persian Gulf: G. E. Pilgrim, 507 †
Persian Gulf—*continued.*
  Salzeghalt des Persischen Golfes: G. Schott, 344 †
Peru—
  Arc of Peru, Measurement of, 575
  Boundary between Ecuador and Peru and Colombia, 92
  Découverte de trois précieux ouvrages du Métis, péruvien Blas Valera, qu'on croyait détruits en 1596: M. G. de la Rosa, 732 †
  Fisionomia minera de las provincias de Tayacaja, Angaraes y Huancavelica: E. I. Dueñas, 732 †
  Irrigacion del valle de Ica, El problema de la: C. W. Sutton, 231 †
  Lagunas de Huarochiré y su futuro ensanche: W. T. Turner, 732 †
  Limites Peruano-Boliviana ante el Arbitro Argentino, Cuestión de: V. A. Belaunde, 342 †
  Photographs of Rio Perené, Peru: Don C. Cipriani, 740 †
  Peru: C. R. Enock, 81 §
  Story, People, and Religion: G. Guiness, 231 †, 593 §
  Valles de Ilo, Moquegua ó Ica, Dos informes sobre los: V. F. Marsters, 732 †
Petrie, D., Account of a Visit to Mount Hector, etc., 509 †, 602 §
Pettersson, O., Ueber Meeresströmungen, 510 †; and G. Schott, On importance of International Exploration of Atlantic ocean, 68 *
Peucker, K., Generalkarte von Serbien und Montenegro, 622 †; Neue Bemerkungen zur Theorie und Geschichte des Kartenbildes, 232 †; Oesterreichische Topograph J. C. Müller (1673-1721) und die Vaterländische Kartographie, 339 †
Philip, G., Comparative Series of Outline Physical Maps, 625 †; Geographical Pictures: P. H. L'Estrange, 712 §; Handy Administrative Atlases: England and Wales, 235 †; Scotland and Ireland, 622 †; Handy Atlas and Gazetteer of British Isles, 735 †; Irish Channel (map), 512 †; Timber and Mercantile Map of Baltic, 110 †
Philippi, E.: *see* Murray, Sir John
Philippines—
  Ethnographie von Nord-Luzon, Beiträge zur: H. Fehlinger, 507 †
  Maps: Mancayan-Suyoc, Lepanto Province (Dept. of Interior, Manila), 514 †
  Mineral Resources: W. D. Smith, 340 †, 597 §
Photographs—
  Africa, British East, Photographs of: J. Bois, 239 †
  America, South: W. S. Barclay, 116 †
  Asia, Eastern, 239 †
  Bechuanaland Protectorate: A. W. Hodson, 351 †

Photographs—*continued.*
Borneo, Japan, etc.: F. R. H. Garrett, 738 †
China, Western: J. W. Brooke, 739
Hawaii and Fiji islands, 739 †
Iceland and Faröe islands: J. F. Stackhouse, 351 †
India and Burma: A. S. Waley, 627 †
Japan: A. S. Waley, 352 †
Kumaon and Mansarowar Region of Tibet: T. G. Longstaff, 351 †
Mauritius, 628 †
Mexico: H. Wallach, 739 †
New Zealand and Tasmania, 739
Nigeria, Northern: fforde Searight, 240 †; V. Cruz, 240 †
Nyasaland: W. C. Piercy, 352 †
Peru, Rio Perené: Don C. Cipriani, 740 †
Scotland: F. V. Longstaff, 740 †
Shan-tung, Chiang-su, and Chiang-hsi provinces: H. R. Davies and A. H. Hilton-Johnson, 627 †
Uganda: C. E. Fishbourne, 628 †
Photography—
Stereoscopic photography applied to reconnaissance and rapid surveys: F. V. Thompson, 509 †
Wellcome's Photographic Exposure Record and Diary. Northern Hemisphere, 235 †
Piercy, W. C., Photographs of Nyasaland, 352 †
Pilbara goldfield, West Australia: Geological features and mineral resources: A. G. Maitland, 618 †
Pilgrim, G. E., Geology of Persian Gulf, 507 †
Pirie, P., Kashmir, the Land of Streams and Solitudes, 226 †, 322 §
Pisa, Story of: J. Ross, and N. Erichsen, 592 §, 613 †
Pitard, J.: *see* Proust, L.
Pitt, W., Swallow-holes in Chalk, 196 *
Pjetures, H., Einige Hauptzüge der Geologie und Morphologie Islands, 612 †
Plane-table and its use in surveying: W. H. Lovell, 233 †
Plants—
Deutschlands Pflanzengeographie: O. Drude, 108 †
Lichtgenuss der Pflanzen: J. Wiesner, 107 †
Platania, G., Marine phenomena during Calabrian earthquake of 1905..505 †; Nuove ricerche sulle librazioni del mare, 510 †
Pliny—
Geographie Afrikas bei Plinius und Mela und ihre Quellen: D. Detlefsen, 598 §, 615 †
Pöch, R., Explorations in South Africa, 600; Zweiter Bericht über meine phonographischen Aufnahmen in Neu-Guinea, 343 †
Polar regions—
Problème de l'auto polaire: H. Arctowski, 618 †
Pole of the Earth—
Italia nel problema degli spostamenta del polo sul geoide: E. Millosevich, 619 †
Polilof, D., Influence of Siberian rivers on waters of Arctic ocean and Kara sea, 507 †
Port-au-Prince, Haiti, 642
Portugal—
Maps: Carta dos Arredores de Lisboa (Serviço do Estado Maior), 735 †
Poru-tso, Tibet, 385
Potter, S., Coronado's Route through Northern Mexico and Arizona, 91
Pouperon, P., Deuxième mission dans la Sangha, 228 †
Priester, H., Oberflächengestalt und Lage Irlands, etc., 727 †
Princesse Alice, Compagne scientifique de la, Liste des stations (1908), 733 †
Prindle, L. M., F. L. Hess, and C. C. Covert, Fairbanks and Rampart Quadrangles, Alaska, 103 †
Privat-Deschanel, P., Australie pastorale, 617 †; Question de l'eau dans le bassin du Murray, 105 †
Prjevalsky, Colonel, travels in the Ordos country, 668
Problems in Exploration: II. Ordos: W. R. Carles, 668 *
Proust, L., et J. Pitard, Les Iles canaries, déscription de l'archipel, 729 †
Pullar, L.: *see* Murray, Sir J.
Pumpelly, R., Explorations in Turkestan: Expedition of 1904..728 †
Punic War, Second, Austrian Expedition for Investigation of Battlefields of: J. Kromayer, 496
Punta Gorda, Chile, Ruins at, 268, 269
Purari river, New Guinea, D. Mackay's expedition up, 93
Putnam, G. R., Nautical charts, 232 †

Q.

Quebec—
Bulletin de la Société de Géographie de Québec, 1908..346 †
Tremblements de terre de la région de Quebec: J.-C. K. Laflamme, 229 †
Queensland—
Maps: Geological sketch-map showing mineral localities: B. Dunstan and H. W. Fox, 114 †; Queensland, showing principal mining centres and railways: W. H. Greenfield, 114 †: Etheridge Goldfield: W. H. Greenfield, 114 †
Quensel, P. D., Studies on the geology and geography of the coastal cordillera from the Straits of Magellan to Chiloe, 290

R.

Rabot, C., Capture de la Sambre supérieure par l'Oise, 100 †; Expédition Mylius Erichsen dans le Grönland nord-orientale, 343 †

Rainfall—
Geographical Distribution of Mean Annual Rainfall of Wales and Monmouthshire: G. B. Williams, 297 *
Relation of rainfall to depth of water in a well: J. Smith, 344 †
Rakaia river, New Zealand, 723
Rakas-Tal, Lake, hydrographical problem of, 424, 430
Rand, McNally & Co., Indexed County and Railroad Pocket Map, etc., of New York, 625 †; New Handy Map of New York City, 625 †
Range, P., Reisestudien in Gross-Namaland, 729 †
Rangitata river, New Zealand, 723
Rankin, R., In Morocco with General d'Amade, 103 †, 210 §
Ransom, E., The Faroes, 100 †
Ransome, F. L., and F. C. Calkins, Geology and ore deposits of Cœur d'Alene district, Idaho, 230 †
Rasmussen, K., People of the Polar North, 106 †, 204 §: Under Nordenvindens Svøbe, 204 §
Ravenstein, E. G., honorary degree conferred on, 725; Martin Behaim, his life and his globe, 234 †, 679 §
Rawling, C. G., R.G.S. award to, 594, 610; on Manasarowar Lake and Source of Sutlej, 411; remarks on "Discoveries in Southern Tibet," 422
Rawson, H. E., Anticyclonic belt of southern hemisphere, 344 †
Rayleigh, Lord, Note on tidal bores, 733 †
Reclus, E., L'homme et la terre, 734 †
Red sea—
Perlfischerleben im Roten Meere: A. Kaiser, 730 †
Reeves, E. A., Special Lectures on Maps and Map-making, 502
Regel, F., Panamakanalfrage, 509 †
Reich, E., Handbook of geography, 107 †
Reid, Whitelaw, remarks on "Scenery of Cuba, Hispaniola (Haiti), and Jamaica," 666
Reinhardt, L., Mensch zur Eiszeit in Europa, 83 §
Reitfontein area, Cape of Good Hope, Report on: J. F. Herbst, 507 †
Renaissance, Art of the, and its relation to Geography, 540
Revel, —, La Normandie et les Normands, 100 †
Reviews—
Africa, British East, Survey Dept., Annual Report, 1907–08..314
Africa, South, Guide to: A. S. and G. G. Brown, 323
African Highways, Some: C. Kirkland, 323
African Journey, My: W. S. Churchill, 323
Afrique du Nord: H. Lorin, 708
Americans, The Other: A. Ruhl, 210
Amérique Centrale, Richesses de l': D. Pector, 202

Reviews—*continued.*
Antilles, Les Grandes: D. Bellet, 714
Arctic Ice, Conquering the: E. Mikkelsen, 493
Arolla, Guide to Walks and Climbs round: W. Larden, 84
Asia. Eine Reise durch Zentral Asien im Jahre 1906..313
Asia, Pulse of: E. Huntington, 490
Asia: Stanford's Compendium of Geography and Travel: A. H. Keane, 714
Australasia: Stanford's Compendium of Geography and Travel: F. H. Guillemard and A. H. Keane, 714
Baganda at Home: C. W. Hattersley, 210
Baghdad, By Desert Ways to: L. Jebb, 322
Bird Hunting through Wild Europe: R. B. Lodge, 321
Bosnia and Hercegovina with a Paint-brush, Through: E. R. Whitwell, 713
British Army, Recollections of a Life in: Sir R. Harrison, 324
Brown, George, Pioneer Missionary and Explorer, 714
Camp Fires on Desert and Lava: W. T. Hornaday, 323
Canada et Canadiens: A. Loir, 323
Canada's Fertile North Land: E. J. Chambers, 200
Canyon Voyage: F. S. Dellenbaugh, 714
Chinese Empire, Comprehensive Geography of: L. Richard, 200
Colombie britannique: A. Métin, 201
Colonisation chez les Peuples Modernes: P. Leroy-Beaulieu, 84
Commerson, P., Life of: S. P. Oliver, 714
Corsica: J. M. Chapman, 84
Corsica, Through, with a Paint-brush: E. R. Whitwell, 321
Cortés, Letters of: F. A. MacNutt, 80
Cyprus, Travels in Island of: G. Mariti and C. D. Cobham, 713
Dan to Beersheba: A. R. Colquhoun, 317
Egypt, Report on Works of Survey Dept.: H. G. Lyons, 314
Empire, Outposts of: J. Lang, 324
Empire Story, Our: H. E. Marshall, 324
En Route: R. Trevor, 85
Europa (Asturies) Aux Picos de: F. de Negrin, 199
Europe, East End of: A. Upward, 321
Far East revisited: A. G. Angier, 322
Far East, Wanderings in the: Earl of Ronaldshay, 489
Fijians, a Study of Decay of Custom: B. Thomson, 203
Galicia, the Switzerland of Spain: A. M. B. Meakin, 713

Reviews—*continued.*
Geographical Pictures, Philips': P. H. l'Estrange, 712
Geography, Elements of: H. N. Stephenson, 208
Geography, Physical, Practical Exercises in: W. M. Davis, 318
Geography, Practical: J. F. Unstead, 318
Geography, Primer of Practical: J. W. Henderson, 209
Geography, Rational: E. Young, 209
Geography, Regional, Asia: J. B. Reynolds, 209
Geography, School Text-book of: L. W. Lyde, 208
Geography, Scientific, The World: E. W. Heaton, 209
Geography, Text-book of: C. S. Fry, 209
Greece. Handbook for Travellers: H. Baedeker, 321
Grenfell, George, and the Congo: Sir H. Johnston, 491
High Andes of Ecuador, In the: Hans Meyer, 82
Hindustan: Indische Reiseeindrücke: E. Hengstenberg, 322
Historical Geography on a Regional Basis: E. W. Dann, 208
India and Burmah, From Edinburgh to: W. G. B. Murdoch, 85
India, Commercial Products of: Sir G. Watt, 322
India, European Travellers in: E. F. Oaten, 714
India, Short cut to: D. Fraser, 707
Ireland, "Contour" Road-book of: H. R. G. Inglis, 85
Italia, Studi Geografici sulle Frane in: R. Almagià, 199
Kashmir, Land of Streams and Solitudes: P. Pirie, 322
King's Highway: R. Ryves, 210
Kingston-upon-Hull, Origin of: J. Travis-Cook, 713
Korea with Marquis Ito, In: G. T. Ladd, 85
Land of Midnight Sun, Mountaineering in: A. Le Blond, 320
Lands beyond the Channel: H. J. Mackinder, 318
Levantine Riviera: W. T. Beeby and E. Reynolds-Ball, 321
London, Old, Memorials of: P. H. Ditchfield, 312
McClintock, Admiral Sir Leopold, Life of: Sir C. Markham, 709
Madeira Old and New: W. H. Koebel, 713
Mariner of England: S. Childers, 86
Memories of my Life: F. Galton, 205
Menelik, Kaiser, Im Auto zu: A. Holtz, 323
Mensch zur Eiszeit in Europa: L. Reinhardt, 83
Mexico, das Land der blühenden Agave: J. Lauterer, 201
Reviews—*continued.*
Mexico, Wirtschaftsgeographie von: K. Sapper, 201
Mongols: a History: J. Curtin, 320
Morocco with General d'Amade, In: R. Rankin, 210
Mountains of the Moon, Tramps round: T. B. Johnson, 85
New Zealand: R. Horsley, 324
Nieuw-Guinea-Expeditie 1904–5 van het Kon. Ned. Aardrijkskundig Genootschap, De Zuidwest, 202
Nordenvindens Svøbe, Under: K. Rasmussen, 204
Pénétration Saharienne (1830–1906): A. Bernard and N. Lacroix, 79
People of the Polar North: K. Rasmussen, 204
Perse d'aujourdhui: E. Aubin, 322
Persia. Journal der Reis van den Gezant der O. I. Compagnie Joan Cunæus naar Perzie in 1651–1652 door Cornelius Speelman: A. Hotz, 706
Peru: C. R. Enock, 81
Revanche de la Banquise. Un été de dérive dans la mer de Kara: Duc D'Orléans, 708
Ruwenzori: an Account of Expedition of Duke of the Abruzzi: F. de Filippi, 75
Ruwenzori, Viaggio di Esplorazione e primi Ascenzioni: F. de Filippi, 75
Safari, On: A. Chapman, 323
Spain, Bridle Roads of: G. J. Cayley, 321
Surrey, Highways and Byways in: E. Parker, 321
Transvaal and Rhodesia, Reports on Geodetic Survey of: Sir W. G. Morris and H. W. Gordon, 314
Valladolid, Oviedo, etc.: A. F. Calvert, 84
Western sea, Search for the: L. J. Burpee, 316
Reynolds, J. B., Regional Geography Asia, 209 §: British Isles, 235 †
Reynolds-Ball, E.: *see* Beeby, W. T.
Rhine—
Hochwasserverhältnisse im Deutschen Rheingebiet, Ergebnisse der Untersuchung der, 504 †
Rheindiluvium talwärts von Bingerbrück: B. Stürtz, 612 †
Speisung des Rheins aus dem Alpen- und Mittelgebirgslande bei Niedrigwasser: H. Keller, 505 †
Temperaturverhältnisse der oberrheinischen Tiefebene: A. Knörzer, 504 †
Rhodesia—
Geodetic Survey of Southern Rhodesia, etc., Reports on: Sir W. G. Morris and H. W. Gordon, 314 †
Lenje handbook: A. C. Madan, 229 †
Rhone—
Alte Talboden im Rhonegebiet: H. Hess, 99 †

Riabushinsky, T., Expedition to Kamchatka, 719
Ribeira de Iguape, Rio. Exploração do, 342 †
Richard, G., Archipel de Kerguélen et les autres îles australes françaises, 617 †
Richard, L., Comprehensive Geography of Chinese Empire, 200 §
Richards, T. H., Cyprus Civil List, 1908..101 †
Richardson, R., Influence of natural features and geology of Scotland on the Scottish people, 339 †
Richardson, William, A Mariner of England: S. Childers, 86 §
Richthofen, F. v., Vorlesungen über Allgemeine Siedlungs- und Verkehrsgeographie: O. Schlüter, 234 †
Riembau, F., De Dakar au Niger, 616 †
Rikachef, M. M., Influence of nature of Earth's surface on diurnal variation of absolute humidity, 620 †
Ripon falls, Nile river, 124
Rivara, J. H. da Cunha, Catalogo dos manuscriptos da Bibliotheca Publica Eborense, 108 †
Rivers—
Low-water channels in rivers and estuaries: T. S. Ellis, 344 †
Matter in Suspension and Solution in Rivers: A. Strahan, 578
Méthode simple servant à l'étude du régime des fleuves pendant plusieurs années et son application au bassin du Dnépr: E. V. Oppokov, 733 †
Riviera—
Levantine Riviera: W. T. Beeby and E. Reynolds-Ball, 225 †
Robinson, H. H., Ancient water-planes and crustal deformation, 731 †
Rocky mountains—
Mountain forms in Canadian Rockies, Causes of: A. P. Coleman, 731 †
Ronaldshay, Earl of, A wandering student in the Far East, 226 †, 489 §
Ross, A., Fur Hunters of Far West, 108 †
Ross, J., and N. Erichsen, Story of Pisa, 592 §, 613 †
Ross, R., Report on prevention of malaria in Mauritius, 229 †
Roth, H. L., Trading in Early Days, 620 †
Rothaug, J. G., Karte der Königreiche Ungarn und Galizien und des Herzogtums Bukowina, 511 †; Politische Karte der Oesterreichisch-Ungarischen Monarchie nebst angrenzenden Gebieten, 622 †
Roubaud, E., Résultats actuels des travaux biologiques de la Mission d'Etudes de la Maladie du Sommeil, 345 †
Rouillard, E., Côte nord du Saint-Laurent et le Labrador Canadien, 229 †
Roux, F. C., Production du coton en Egypte, 228 †
Rovuma, German Portuguese boundary south of: Captain Schlobach, 499
Roy, W., Account of measurement of a base on Hounslow Heath, 108 †: Account of mode . . . for determining relative situation of Royal Observatories of Paris and Greenwich, 109 †
Royal Geographical Society—
Awards for 1909..593, 610
Christmas Lectures, 224
Library and Map Collection, Older Works added in 1908..107
Meetings, Session 1908-1909..98, 224, 337, 502, 609, 725
Research Department Meetings, 502
Rubenson, C. W., Kabru in 1907..506 †
Rubinow, I. M., Russia's Wheat Trade, 225 †
Rudolf, Lake, Discovery of, 130
Ruhl, A., Other Americans: cities, countries, and especially people of South America, 105 †, 210 §
Russia—
Expansion towards Asia and Arctic in Middle Ages: C. R. Beazley, 495 §, 505 †
Maps: Southern Asiatic Russia (Ministry of Ways and Communications), 347 †
Wheat Trade: I. M. Rubinow, 225 †
Ruthven, J. F., Moxly's theory of the tides, 510 †
Rutter, F. R., Cereal Production of Europe, 100 †: European Grain Trade, 100 †
Ruwenzori—
Expedition of H.R.H. Duke of the Abruzzi, An Account of: F. de Filippi, 75 §, 229 †, 721
Il Ruwenzori, Viaggio di Esplorazione e primi Ascenzioni: F. de Filippi, 75 §
Ryves, R., King's Highway, 210 §

S.

Saavedra, B., Cuestión fronteriza con el Paraguay, 104 †
Sabart, Grottes de: Mollard et E.-A. Martel, 612 †
Sack, Baron A. von, Narrative of voyage to Surinam, etc., 109 †
Safari, On: A. Chapman, 323 §
Sahara—
Ethnographie ancienne du Sahara central, Notes pour servir à l'étude de l': L. Voinot, 730 †
Isohyets 'twixt Sahara and Western Sudan: A. Knox, 697 *
Journey from Tripoli across Sahara to Lake Chad: H. Vischer, 241 *
Map: Carte de la Mauritanie (Service Géog. des Colonies, Paris), 736 †
Nos Confins Sahariens: E. Arnaud et M. Cortier, 582 §
Pénétration Saharienne (1830-1906): A. Bernard and N. Lacroix, 79 §
Sables du Sahara Algérien: G. Cauvet, 341 †
Vegetationsbilder von Nordrand der

Sahara—*continued.*
algerischen Sahara : H. Brockmann-Jerosch und A. Heim, 341 †
Saint-Jours, —, Sables marins de la côte landaise, 504 †
Saint-Léger, — de, Reconnaissance de le région de Bir-Hadjaj, 341 †
St. Louis, West Africa, Rainfall of, 697
St. Martin, V. de, et F. Schrader, Atlas Universal de Géographie, 115 †
Sakhalin—
Four weeks in Saghalien : C. R. Woodroffe, 614 †
Saltoro glacier and pass, Himalayas, 88
Sambre river—
Capture de la Sambre supérieure par l'Oise : C. Rabot, 100 †
San Francisco—
Earthquake of 1906..578
Sangha—
Deuxième mission de P. Pouperon dans la Sangha, 228 †
Sanitary Science, Essentials of : G. E. Brooke, 235 †
Sanson, N., Voyage, ou relation de l'état present du royaume de Perse, 109 †
Santa Cruz, Alonso de, Karten von Amerika in dem Islario General des : F. R. von Wieser, 687 §
Santiago, Cuba, 641
Santo Domingo, Mountains of, 652
São Paulo—
Climate of, 332
Meteorologico e o Clima do Estado de S. Paulo : J. N. B. Mattos, 105 †
Railway in, 28
São Paulo du Brésil : L. Casabona, 230 †
São Thomé—
Expedition to Island of São Thomé : B. Alexander, 90
Mission scientifique à l'île de San Thomé, Rapport : C. Gravier, 730 †
Sapper, K., Expedition in Bismarck Archipelago, 333 ; Wirtschaftsgeographie von Mexico, 201 §
Sarasin, F., Forschungsreise nach Ceylon und die Steinzeit der Weddas, 340 †
Sarasin, P. and F., Ergebnisse naturwissenschaftlicher Forschungen auf Ceylon, 101 †
Sardinia—
Magnetico della Sardegna, Sul rilevamento : L. Palazzo, 613 †
Sarre, Canalization of, 211
Saurel, R., Rapport sur la mission de prospection dans la région de Quan-ba, 614 †
Saxony—
Pflanzengeographische karten aus Sachsen : O. Drude, 101 †
Wirtschaftsgeographische Verhältnisse . . . des sächsischen Erzgebirges : F. Weissbach, 225 †
Sayce, A. H., discovery of ruins of Meroe, 327
Scandinavia—
Bidrag til Skandinaviens Reliefkronologii : W. Wråk, 726 †
Scarabs recording first circumnavigation of Africa, Forgery of, 214
Schaad, E., Die Juranagelfluh, 99 †
Schaeberle, J. M., Explanation of cause of eastward circulation of our atmosphere, 344 †
Scheerer, O, Ethnographischer Bericht über die Insel Botel Tobago, 506 †
Schenck, A., Etude sur l'anthropologie de la Suisse, 727 †
Schenck, H., Alpine Vegetation, 339 †
Schiötz, O. E., Bemerkungen über die durch den Wind erzeugten Meeresströmungen, 510 † ; Ueber die Schwerkraft auf dem Meere länga dem Abfall der Kontinente gegen die Tiefe, 619 †
Schlaginhaufen, O., Besuch auf den Tanga-Inseln, 509 † ; Orientierungsmärsche an der Ostküste von Süd-Neu-Mecklenburg, 509 †
Schlobach, —, German-Portuguese Boundary south of Rovuma, 499
Schlüter, O., F. v. Richthofen's Vorlesungen über Allgemeine Siedlungs- und Verkehrsgeographie, 234 †
Schmidt, —, Zoological researches in Kamchatka, 719
Schmidt, W., Sonnenzeiger für verschiedene Breiten und Jahreszeiten, 238 †
Schoolcraft, H. R., Narrative journal of travels from Detroit north-west . . . to sources of Mississippi, 109 † ; Narrative of an expedition through Upper Mississippi to Itasca Lake, 109 †
Schott, G., Bedeutung einer internationalen Erforschung des Atlantischen Ozeans, 344 † ; Salzgehalt des Persischen Golfes, etc., 344 † ; and O. Pettersson, on importance of international Exploration of Atlantic Ocean, 68 *
Schrader, F. : *see* St. Martin, V. de
Schropp, S., Map of Constantinople, 735 †
Schultze, E., Bedeutung des Sandshak Schultze, 727 †
Schumacher, G., Karte von Ostjordanlandes, 347 †
Schütze, H., Vier schönsten Seen im Lande Sternberg, 504 †
Scientific Memoirs, Suggestions for improving literary style of : F. Galton, 511 †
Scobel, A., Geographisches Handbuch, 511 †
Scotland—
Bathymetrical Survey of Fresh-water Lochs of Scotland : Sir John Murray and L. Pullar, 613 †
Ethnology, Scottish, Last Contribution to : J. Beddoe, 506 †
Glacial Erosion in Scottish Highlands : R. S. Tarr, 506 †
Glaciation of East Lothian : P. F. Kendall and E. B. Bailey, 339 †

Scotland—*continued.*
Influence of natural features and geology of Scotland on Scottish people: R. Richardson, 339 †
Maps: Bartholomew's Contoured Road-map of Scotland, 623 †; Handy Administrative Atlas of Scotland: G. Philip, 622 †
Photographs of Scotland: F. V. Longstaff, 740 †
Scott, H., Explorations in the Seychelles, 214
Scott-Elliot, G. F., remarks on "Fifty years of Nile Exploration," 152
Scott-Moncrieff, Sir C., remarks on "Fifty Years of Nile Exploration," 148
Searight, fforde, Photographs of Northern Nigeria, 240 †
Sechuan, Western, A. F. Legendre's Explorations, 327
See, T. J., Further researches on physics of the Earth, 344 †
Seeley, H. G., obituary, 221
Seidel, H., Wassermangel des Haho und Schio, 341 †
Seiner, F., Karte des Gebiets zwischen Okawango und Sambesi, 348 †
Selle, Mont de la, Haiti, 651
Sellner, A., Geomorphologische Studien . . . aus dem südlichen Böhmerwalde, 339 †
Selous, F. C., Big game in South Africa and its relation to tsetse fly, 730 †
Semitic magic: its origins and development: R. C. Thompson, 228 †
Senegal—
Dakar au Niger, De: F. Riembau, 616 †
Maps: Carte du Senegal (Government Gén. de l'Afrique Occidentale Française), 348 †
Senge-tsangspo, or Lion river, 401
Senussi sect of Sahara, 264, 265
Serra do Mar, mountains, Brazil, 3
Servia—
Eiszeitspuren in Serbien: R. Vasovic, 505 †
Maps: Generalkarte von Serbien und Montenegro: K. Peucker, 622 †
Seychelles—
Explorations by J. S. Gardiner in the Seychelles, 214
Shackleton, E. H., Achievement of: H. R. Mill, 569 *; Antarctic Expedition, 94, 485; Special medal awarded by R.G.S., 594, 610
Shaka oasis, North Arabia, 525
Shakangsham mountain, Tibet, 382
Shari river—
Étude sur le Tchad et le Bassin du Shari: H. Freydenberg, 581 §
Shaw, Dr., remarks on "Isohyets 'twixt Sahara and Western Sudan," 702
Sherring, C. A., on hydrography of Lake Manasarowar, 410
Sherzer, W. H., Nature and activity of Canadian glaciers, 731 †
Siam—
Siam ancien: archéologie, épigraphie, géographie: L. Fournereau, 728 †
Survey Department, Royal, General Report on operations of, 340 †
Wahrhaftige Beschreibungen dreyer mächtigen Kgr. Japan, Siam, and Corea: C. Arnold and others, 107 †
Sierra Leone—
Mende language: F. W. Migeod, 229 †
Siberia—
Expedition to Northern Siberia: J. P. Tolmachof, 720
Koryak: material culture and social organization: W. Jochelson, 507 †
Originalkarte Sibiriens aus dem 17. Jahrhundert: A. W. Grigorieff von H. Michow, 340 †
Rivers, Influence of, on waters of Arctic Ocean and Kara Sea: D. Polilof, 507 †
Sibree, J., Gallieni's 'Neuf ans à Madagascar,' 581 §
Sierra Maestra range, Cuba, 642
Sievers, Dr., Rain curves in Niger Bend region, 698
Sifan tribe, Chino-Tibetan frontier, 89
Signals—
Seezeichen, Leuchtfeuer und Schallsignale des Atlantischen Ozeans: A. Hiebel, 345 †
Silhouette island, Seychelles, 214
Sion, J., Paysans de la Normandie orientale, 612 †
Skertchly, S. B. J., Origin of Australia, 617 †
Ski—
Practical Uses of Ski: C. Hordern, 220
Uses and possibilities of Ski, Notes on: C. Hordern, 734 †
Skottsberg, C., Swedish Magellanic Expedition, 1907–09. . 289 *
Sledge Expedition across North Polar Region: A. H. Harrison, 689 *
Sleeping-sickness—
Travaux biologiques de la Mission d'Études de la Maladie du Sommeil. Résultats actuels des: E. Roubaud, 345 †
Sleyb tribe, Arabia, 524, 534
Smith, G., A Naturalist in Tasmania, 618 †
Smith, J., Relation of rainfall to depth of water in a well, 344 †
Smith, L. T., Itinerary of John Leland, 591 §, 613 †
Smith, S. P., Captain Dumont d'Urville's exploration of Tasman Bay in 1827. . 232 †
Smith, W. D., Mineral Resources of Philippine Islands, 340 †, 597 §
Sneeuwgebergte range, Dutch New Guinea, 202
Sobat, tributary of Nile, 142
Soil wastage: T. C. Chamberlin, 345 †
Somaliland—
Map: Carte de la Côte Française des

Somaliland—*continued.*
Somalis (Service Géog. des Colonies, Paris), 736 †
Soma-tsangpo, Tibet, 382
Somervail, A., Ancient and perished volcanoes of Devon, 727 †
Sounding machine for use on lakes and rivers without a boat, Note on: E. J. Garwood, 510 †
South Victoria Land, Climatology of: C. Hepworth, 188
Sovyetof, S., Changes in sea-level on coasts of Denmark, 504 †; Periodic changes in Gulf Stream and surrounding waters, 510 †
Spain—
Aux Picos de Europa (Asturies): F. de Négrin, 199 §
Bridle Roads of: G. J. Cayley, 321 §
Observaciones meteorologicas, 1906.. 226 †; *id.*, 1907..613 †
Wild Birds in Spain, My Life among: W. Verner, 225 †, 592 §
Speelman, C., Journal der reis van den gezant der B. I. Compagnie Joan Cunaeus naar Perzië in 1651–1652: A. Hotz, 614 †
Speight, R., Some Aspects of Terrace-development in Valleys of Canterbury Rivers, 509 †, 721 §
Speke, Captain J. H., Jubilee of discovery of source of white Nile by, 117
Speke, Mount, Ruwenzori, 77
Spence, M., Climate of Orkney, 324 §, 506 †
Spencer, J. W., Diversion of Water from Niagara and its Effects, 601, Side issues bearing on age of Niagara Falls, 508 †; Spoliation of Falls of Niagara, 731 †
Spethmann, H., Glaziale Stillstandslagen im Gebiet dei mittleren Weser, 501 †; "Hartling" für monadnock, etc., 619 †; Inner-Island, 225 †; Nordrand des isländischen Inlandeises Vatnajökull, 505 †, 595 §; Vulkanologische Forschungen im östlichen Zentralisland, 504 †
Spicer, E. C., Solution-valleys in Glyme Area, Oxfordshire, 506 †
Spiers, W. S., Morden and Lea's plan of London, 1682..727 †
Spruce, R., and A. R. Wallace, Notes of a botanist on Amazon and Andes, 231 †, 588 §
Stackhouse, J. F., Photographs of Iceland and Faröe Islands, 351 †
Stahl, A. F., Geologische Karte von Nordwest-Persien, 348 †
Standen, R.: *see* Melvill, J. C.
Stanford, E., Compendium of Geography and Travel. Southern and Western Asia: A. H. Keane, 613 †, 714 §; ditto, Australasia: F. H. Guillemard, 714 §; New map of Metropolitan Railways, etc., 623 †
Stanley, Sir H. M., African discoveries of, 127
Stanley, Mount, Ruwenzori, 77
Starr, F., In Indian Mexico, 616 †
Statistics—
Statistique annuelle de géographie comparé: J. Birot, 345 †
Stead, D. G., Edible fishes of New South Wales, 231 †
Steamships—
Verkehrsgebiet der Hamburg-Amerika Linie und des Norddeutschen Lloyd: G. W. v. Zahn, 620 †
Steensby, H. P., Nogle etnografiske Iagttagelser fra en Rejse i Algier og Tunis, 1908..341 †
Stein, Baron V., Verkehrsstrasse von Duala nach der Ostgrenze Kameruns, 508 †
Stein, M. A., Expedition in Central Asia, 597; R.G.S. Medal awarded to, 593, 610
Steinmann, G., Unterricht in Geologie und verwandten Fächern auf Schule Universität, 346 †
Stephenson, H. N., Elements of Geography, 208 §
Sternberg, Lande, Die vier Schönsten Seen im: H. Schütze, 504 †
Sterneck, R. von, on Tidal Wave of the Adriatic, 86
Steudel, —, Kann der Deutsche sich in den Tropen akklimatisieren, 345 †
Steuer, A., Bodenwasser und Diluvialablagerungen im hessischen Ried, 504 †
Stevenson, E. L., Marine World Chart of Nicolo de Canerio, 683 §
Stiasny, G., Eine Reise nach Westgrönland, 618 †
Stone, R. W., Coal resources of Russell Fork Basin in Kentucky and Virginia, 342 †
Strachey, H. and R., Journeys and discoveries in Tibet, 400, 402
Strahan, A., Matter in Suspension and Solution in Rivers, 578; remarks on "Geographical Distribution of Mean Annual Rainfall of Wales and Monmouthshire," 305, 308; "Proposed Sledge Expedition across North Polar Region," 692; "Isohyets 'twixt Sahara and Western Sudan," 702
Strathmore, Vale of, Old Red Sandstone of, 580
Struck, B., An unlocated tribe on White Nile, 616 †; König Ndschoya von Bamum als Topograph, 341 †; Vocabulary of the Fipa language, 228 †
Stübe, R., Reise des Afanassij Nikitin nach Indien in den Jahren 1466–72.. 506 †
Stürtz, B., Rheindiluvium talwärts von Bingerbrück, 612 †
Sudan—
Archæological and Ethnological Investigations: Lieut. Desplagnes and L. Frobenius, 720
Central: French operations in the, 90

Sudan—*continued.*
Deux contre-rezzous dans l'Ouaddaï, l'Enndi et le Borkou: Commdt. Bordeaux, 730 †
Geographical Work in the Sudan, C. Chaillé-Long's, 90
Isohyets 'twixt Sahara and Western Sudan: A. Knox, 697 *
Sudry, L., Sur un genre particulier de fond marin dans l'étang de Thau, 612 †
Suess, E., Face of the Earth (das Antlitz der Erde), translated by H. Sollas, 106 †
Sullivan, Sir E., Shakespeare and the waterways of North Italy, 225 †
Sulte, B., (Biography of) Étienne Brulé, 345 †
Sumatra—
Handel van Baroes, als oudste haven op Sumatra's westkust, Verklaard: L. van Vuuren, 728 †
Kartographische Ergebnisse meiner Reisen durch die Karo- und Pakpak-Batakländer: W. Volz, 728 †
Sun-dial—
Sonnenzeiger für verschiedene Breiten und Jahreszeiten: W. Schmidt, 238 †
Sun-pan-ting, Tibet, 89
Surinam—
Narrative of a Voyage to Surinam, etc.: Baron A. von Sack, 109 †
Süring, R., Ergebnisse der Gewitter-Beobachtungen in den Jahren 1903–1905.. 101 †
Surrey—
Cambridge County Geographies. Surrey: G. F. Bosworth, 727 †
Highways and Byways in Surrey: E. Parker, 321 §, 506 †
Surridge, V., India (Romance of Empire Series), 592 §, 614 †
Surveying—
Hydrographical surveying: Sir W. J. Wharton and M. Field, 733 †
Improvement in Survey Methods, 576
Plane-table and its uses in surveying: W. H. Lovell, 233 †
Principles and practice of surveying: C. B. Breed and G. L. Hosmer, 733 †
Stereoscopic photography applied to reconnaissance and rapid surveys: F. V. Thompson, 509 †
Text-book of theodolite surveying and levelling for use of students: J. Park, 233 †
Sussex—
Cambridge County Geographies. Sussex: G. F. Bosworth, 727 †
Sutherland, W. J., Physiography of the Gulf coastal plain, 509 †
Sutlej river, Source of, 409, 424
Sutton, C. W., El problema de la irrigacion del valle de Ica, 231 †
Suzuki, Y., Sea of Okhotsk and Coast of Kamtchatka, 340 †
Swaine, C., Early attempts on North-West Passage, 72
Swallow-holes in Chalk: W. Pitt, 196 *
Swanton, J. R., Jesup North Pacific Expedition. Vol. 10, Haida texts—Masset dialect, 104 †
Sweden—
Härjedalens Vegetation: S. Birger, 505 †
Lapp Migrations into Sweden, 210
Swedish Magellanic Expedition, 1907–09: C. Skottsberg, 289 *
Switzerland—
Anthropologie de la Suisse, Etude sur l': A. Schenk, 727 †
Cours d'eau du plateau fribourgeois, Contribution à l'étude des: G. Michel, 727 †
Geographisches Lexikon der Schweiz: C. Knapp and others, 339 †
Landeskunde der Schweiz: H. Walser, 226 †
Langues française et allemande en Suisse: R. Henry, 727 †
Maps: Geologische Karte der Schweiz (Schweizerische Geologische Kommission), 513 †; Topographischer Atlas der Schweiz (Abteilung für Landestopographie), 513 †
Scenery of: Lord Avebury, 727 †
Syria—
Notes de géographie syrienne: P. H. Lammens, 729 †
Trade, etc., of Beirut and coast of Syria, Report for 1907 (Consular Reports), 507 †

T.

Tabie-tsaka, 385, 397
Tafel, Dr., Journey through Eastern Ordos, 675
Talbot, Hon. M. G., R.G.S. Medal awarded to, 594, 610
Tanaka, A., and F. Hirasawa, Lake Nojiri, 728 †
Tanga island—
Besuch auf den Tanga-Inseln: O. Schlaginhaufen, 509 †
Tanganyika, discovery of, 122
Tararua range, New Zealand, 602
Targo-gangri or Targot Lha, Tibet, 366, 405
Targot-Yap, Tibet, 419
Tarok-tso, Tibet, 382, 397
Tarr, R. S., Glacial Erosion in Scottish Highlands, 506 †
Tasman bay—
Exploration of Tasman Bay in 1827, Captain Dumont d'Urville's: S. P. Smith, 232 †
Tasmania—
Ben Lomond Plateau, An investigation into physiography of: W. V. Legge, 232 †
Craniology . . . of Aborigines of Tasmania: Sir W. Turner, 618 †
History of Tasmania: J. West, 109 †
Naturalist in Tasmania: G. Smith, 618 †

Tasmania—*continued.*
Photographs of New Zealand and Tasmania, 739 †
Teichmann, O., Eickener See, 504 †
Teleki, Count, African discoveries of, 130; Atlas zur Geschichte der Kartographie der Japanischen Inseln, 736 †
Telesio, B., Dottrine geofisiche di: R. Almagià, 734 †
Temerlik, Tibet, 66
Temperature—
Monthly mean temperature at Edinburgh, Vienna, and Stockholm, Range of: R. T. Omond, 504 †
Temple, Sir R. C., Travels of Richard Bell in East Indies, etc., 1654–1670.. 101 †
Ten Brink, H., Reiskaart van Nederland, 347 †
Teri-nam lake, Tibet, 394
Texas—
Beginnings of Texas, 1684–1718: R. C. Clark, 342 †
Thau, Etang de, Sur un genre particulier de ford marine dans l': L. Sudry, 612 †
Therese Prinzessin von Bayern, Reisestudien aus dem westlichen Südamerika, 231 †
Thimm, C. A., Hindustani self-taught, 226 †
Thompson, F. V., Stereoscopic photography applied to reconnaissance and rapid surveys, 509 †
Thompson, R. C., Semitic magic: its origins and development, 228 †
Thomson, B., The Fijians: a study of decay of custom, 203 §, 231 †
Thomson, J., African discoveries of, 129
Thorbecke, F.: *see* Hassert, K.
Tian-shan mountains—
Exploration in: G. Merzbacher, 278 *
Tibet—
Chinese knowledge of Tibet, 397
Chino-Tibetan frontier, H. D'Ollone's Expedition, 89
Journeys in Tibet, 1906–1908. I. General Narrative: S. Hedin, 353 *; II. Discoveries in Southern Tibet: S. Hedin, 396 *; III. Scientific Results of Dr. Sven Hedin's Expedition: Lord Curzon of Kedleston, 435 *; IV. What we have learned from Dr. Sven Hedin: Sir T. H. Holdich, 436; V. Reply by Dr. Sven Hedin, 439
Photographs of Mansarowar Region of Tibet: T. G. Longstaff, 351 †
Through China to Tibet in 1906: J. W. Brooke, 614 †
Trade and Resources of Tibet: C. E. D. Black, 101 †
Tides—
Moderne Methode der Gezeitenforschung: G. Wegemann, 733 †
Moxly's theory of the tides: J. F. Ruthven, 510 †
Tides—*continued.*
Nuove ricerche sulle librazioni del mare: G. Platania, 510 †
Sekundäre Gezeitenwellen, Ueber: Dr. Wegemann, 733 †
Tidal bores, Note on: Lord Rayleigh, 733 †
Tidal wave of the Adriatic, R. von Sterneck's observations, 86
Tide-tables for British and Irish ports for 1909.. 733 †
Tientsin—
Religion in Tientsin: F. Brown, 226 †
Tierra del Fuego—
Geological fragments from Tierra del Fuego: J. G. Andersson, 617 †
Tigris—
Beurteilung der Aussichten auf eine Wiederbelebung der Kultur der Euphrat- und Tigrisniederung: V. Kurz, 507 †
Timbuktu, rainfall of, 700
Time—
Determination of local time in subtropical latitudes: E. B. Wade and J. J. Craig, 233 †, 509 †
Time and latitude—
Determinacion de la hora y de la latitud jeografica, etc.: A. Obrecht, 343 †
Tippenhauer, L. G., Topographische und geologische Karte des zentralen Teiles der Republik Haïti, 625 †
Tittmann, O. H., Progress of Demarcation of Alaska Boundary, 104 †
Tofteen, O. A., Researches in Assyrian and Babylonian geography, 729 †
Toghri-sai gold-mines, Tibet, 66
Togo—
Kolonial-geographische Skizze aus Togo: H. Seidel, 341 †
Toll, Baron und Baronin von, Russische Polarfahrt der "Sarja," 1900–1902.. 732 †
Tolmachof, J. P., Expedition to Northern Siberia, 720
Tonga islands—
Total solar eclipse of 1911: A. M. Downing, 618 †
Tongking—
Geologie du Haut-Tonkin: G. Zeil, 614 †
Mission de prospection dans la région de Quan-ba, Rapport sur la: R. Saurel, 614 †
Topography—
Relation of geology to topography: D. W. Johnson and F. E. Matthes, 619 †
Toro, French West Africa, 499
Tower, W. S., Human side of systematic geography, 620 †; Mississippi River problem, 342 †
Townsend, C. W., Along the Labrador Coast, 230 †, 592 §
Trabert, W., Meteorologie und Klimatologie, 619 †

Trading in Early Days: H. L. Roth, 620 †
Tranquera de Loreto, Argentine, 18
Transvaal—
Agricultural potentialities of Transvaal: W. Macdonald, 730 †
Bawenda of Spelonken: R. Wessmann, 730 †
Geological Survey, Report for 1907. Mines Department, 730 †
Maps: Transvaal Geological Survey (Mines Dept.), 237 †
Zoutpansberg District, Report on Reconnaissance of: J. G. Trevor and E. T. Mellor, 341 †
Travel—
Itinerastudien: A. Elter, 734 †
Travel and Exploration, new magazine, 94
Travis-Cook, J., Notes on origin of Kingston-upon-Hull, and port of Hull, 713 §
Trengganu State, Malay peninsula, 478, 482
Trevor, R., En Route, 85 §
Trevor, T. G., and E. T. Mellor, Report on Reconnaissance of North-West Zoutpansberg District, 341 †
Triana, M., Por el Sur de Colombia, 731 †
Trinidad—
Geology of Trinidad and Barbados: R. W. Ells, 343 †
Tripoli—
Journey from Tripoli across Sahara to Lake Chad: H. Vischer, 241 *
Trolle, A., Danish North-East Greenland Expedition, 40 *; Summarisk Oversigt over *Danmark* Expeditionens Forløb og Arbejder, 343 †
Tropical medicine—
Review of some of recent advances in tropical medicine, hygiene, etc.: A. Balfour and R. G. Archibald, 620 †
Tropical research in its relation to Missionary Enterprise: Sir P. Manson, 345 †
Trotter, Sir H., remarks on: "Discoveries in Southern Tibet," 418; "Journeys in Tibet, 1906–1908," 394
Truk atol, Caroline islands, 217
Tuareks of Sahara, 260
Tummo mountains or El War, Sahara, 256
Tunis—
Ethnografiske Iagttagelser fra en Rejse i Algier og Tunis 1908: H. P. Steensby, 341 †
Maps: Carte de la Tunisie (Service Géo. de l'Armée), 348 †, 514 †, 624 †; Atlas Archéologique de la Tunisie: E. Babelon, R. Cagnat, S. Reinach, 624 †
Turkestan—
Explorations in Turkestan: Expedition of 1904: R. Pumpelly, 728 †
Turkey—
East end of Europe: A. Upward, 226 †, 321 §
Turkey—*continued*.
Landschaftypen aus dem Orient: E. Banse, 507 †
Maps: Map of Turkey (Geo. Section, General Staff), 513 †; Sketch-maps of Eastern and Western Turkey in Europe (Top. Section, General Staff), 110 †
Turner, Sir W., Craniology . . . of Aborigines of Tasmania, 618 †
Turner, W. T., Lagunas de Huarochiré y su futuro ensanche, 732 †
Tuscany, Leonardo da Vinci's map of, 545, 546
Tyrrell, J. B., Minerals and Ores of Northern Canada, 508 †

U.

Uganda—
Baganda at home: C. W. Hattersley, 210 §, 341 †
British Rule in Uganda, Introduction of, 127
Caves in Western Uganda, Exploration of: H. B. Lewin, 599
Photographs: C. E. Fishbourne, 628 †
Political History of, 131–135
Ulan Khatun, Mongolia, 670
United Kingdom—
Britannia; sive florentissimorum regnorum Angliæ, Scotiæ, Hiberniæ: W. Camden, 108 †
Geographical Conditions affecting British Islands: H. J. Mackinder, 462 *
Handy Atlas and Gazetteer of British Isles: G. Philip, 735 †
Maps: Bathy-orographical Map of British Isles: W. & A. K. Johnston, 512 †; Great Britain, showing Commands, Territorial Force Divisions and Districts (Top. Section, General Staff), 109 †
Meteorological Observations at stations of second order for 1904..506 †
Regional Geography: the British Isles: J. B. Reynolds, 235 †
United States—
Conservation Movement: E. R. Johnson, 342 †
Geodetic investigations, 575
Landeskunde der Vereinigten Staaten von Nordamerika: H. Fischer, 230 †
Maps: Geologic Atlas of United States (Geological Survey), 237 †; State maps compiled from official records at General Land Office and other sources (Dept. of Interior), 114 †
Physiography of the Gulf coastal plain: W. J. Sutherland, 509 †
Unstead, J. F., Oxford Geographies. Part I. Practical Geography, 235 †, 318 §
Upward, A., East end of Europe, 226 †, 321 §

Urals—
Russian Advance to the, 495
Seengebiet am östlichen Abhange des Ural: W. N. Lebedeff, 505 †
Uranium and geology: J. Joly, 344 †, 619 †
Urrutia, F. J., Evolucion del principio de arbitraje en America, 616 †
Urville, Dumont d', Exploration of Tasman Bay in 1827: S. P. Smith, 232 †

V.

Vacher, A., Le Berry, 225 †
Valladolid, Oviedo, etc.: A. F. Calvert, 84 §
Vallaux, C., Géographie sociale, 107 †
Vallée, L., Catalogue des plans de Paris et des Cartes de l'Ile de France, etc., 726 †
Valleys—
Rôle of Solution in Valley-making: A. J. Jukes-Brown, 344 †
Van der Heiden, F. J., Vervarelyke Schip-Breuk van't Oost-Indisch Jacht ter Schelling onder het Landt van Bengale, 109 †
Van der Miesen, J. H., Een tocht langs de noordoost kust van Boeroe, 227 †
Vandervelde, E., Derniers jours de l'Etat du Congo, 729 †
Varley, F. J., Mahableshwar Plateau (Map), 111 †
Vasco, G., Chemin de fer musulman de Hedjaz, 340 †
Vasović, R., Eiszeitspuren in Serbien, 505 †
Vasse, G., Trois années de chasse au Mozambique, 508 †
Vatican, Galleria geografica of the, 569
Vatna Jökull, Nordland des isländischen Inlandeises: H. Spethmann, 505 †, 595 §
Vedova, G. D., Scritta di geografia e di storia della geografia concernanti d' Italia, pubblicati in onore di, 612 †
Venezuela—
Relaciones geográficas de la Gobernación de Venezuela: A. de Altoguirre y Duvale, 617 †
Trabajos del Cuerpo de Ingenieros encargado del levantamiento del Plano Militar de Venezuela, 509 †
Verde river, Brazil, 183
Verner, W., My Life among Wild Birds in Spain, 225 †, 592 §
Vesuvius—
Montagne Pelée après ses éruptions, avec observations sur les éruptions du Vésuve en 79 et en 1906: A. Lacroix, 733 †
Nuova carta del Vesuvio dell' Instituto Geografico Militare: M. Baratta, 505 †
Vézère—
Fouilles scientifiques dans le vallée de la Vézère: O. Hauser, 504 †
Victoria Nyanza—
Discovery of, 122
Victoria Nyanza—*continued.*
Earth-movements round: H. G. Lyons, 328, 730 †
Vidal de la Blache, J., Atlas Général, † 115, 238, 349, 515; Etude sur la Vallée lorraine de la Meuse, 100 †
Vienna—
Maps: Plan von Wien (Artaria & Co.), 511 †; Verkehrsplan der k.k. Reichshauptund Residenzstadt Wien: G. Freytag, 621 †, 735 †
Vigne, G. T., Travels in Mexico, South America, etc., 109 †
Village—
Monographies de Village: J. Halkin, 734 †
Vine—
Géographie de la vigne et la crise viticole: P. Clerget, 620 †
Virginia—
Coal resources of Russell Fork Basin in Kentucky and Virginia: R. W. Stone, 342 †
Vischer, H., Journey from Tripoli across Sahara to Lake Chad, 241 *
Vogelsberg, Occurrence and origin of laterite and bauxite in the: J. R. Kilroe, 504 †
Voinot, L., Notes pour servir à l'étude de l'ethnographie ancienne du Sahara central, 730 †
Volcanoes—
Bemerkungen zu den Ausführungen von Dr. C. Gagel: F. Jaeger, 733 †
Bezeichnung der Vulkanischen Kesseltäler und Schluchten: C. Gagel, 733 †
Eruptions, Some conditions affecting: F. A. Perret, 345 †
Gases, Volcanic, Hypotheses of, 310
Recherches sur le Volcanisme, Quelques: A. Brun, 310 §
Relation of magmatic waters to volcanic action: H. W. Hixon, 345 †
Volcanoes and Earthquakes: E. J. Houston, 233 †, 593 §
Vulcani attivi della Terra: G. Mercalli, 310 §
Volz, W., Kartographiche Ergebnisse meiner Reisen durch die Karo- und Pakpak-Batahländer, 728 †
Von dem Borne, G., Physikalischen Grundlagen der tektonischen Theorien, 233 †
Vuuren, L. van, De handel van Baroes, als oudste haven op Sumatra's westkust, verklaard, 728 †

W.

Wade, E. B., Lunar observations and figure of the Earth, 343 †; and J. J. Craig, Determination of local time in sub-tropical latitudes, 233 †, 509 †
Waimakariri river, New Zealand, 723
Wales—
Rainfall of Wales and Monmouthshire, Geographical Distribution of mean annual: G. B. Williams, 297 *

Waley, A. S., Photographs of India and Burma, 627 †; photographs of Japan, 352 †
Walker, T., remarks on "Panama Canal in 1908," 180
Wallace, A. R.: *see* Spruce, R.
Wallace, W. A., and A. E. Young, map of Negri Sembilan, 623 †
Wallach, H., Photographs of Mexico, 739 †
Walle, P., Dans les hervaes, 732 †
Wallén, A., Régime hydrologique du Dalelf, 727 †
Walser, H., Landeskunde der Schweiz, 226 †
Walther, J., Geschichte der Erde und des Lebens, 233 †
Ward, R. de C., Southern campos of Brazil, 617 †
Waria Expedition, 105 †
Warren, P. D., Survey Dept., Ceylon: Report, 614 †
Warsaw—
  Climat de Varsovie, Variations séculaires du: H. Arctowski, 726 †
Washington, H. S., Submarine volcanic eruptions in the Mediterranean, 722
Waterways: *see* Canals
Watson, Sir C. M., remarks on "Fifty Years of Nile Exploration," 149
Watt, Sir G., Commercial products of India, 226 †, 322 §
Wauters, A.-J., Congo Belge. Une séance historique, 102 †
Waves—
  Deep-sea Waves, Further Observations now required: letter from V. Cornish, 500
  Plan of Sea Waves, E. Kohlschütter's method, 576
Wedderburn, E. M., Freezing of Freshwater Lakes, 219 §, 344 †; Temperature of Loch Garry, 715
Wegemann, G., Moderne Methode der Gezeitenforschung, 733 †; Ueber Sekundäre Gezeitenwellen, 733 †
Weisgerber, F., Les Chaouia, 508 †
Weissbach, F., Wirtschaftsgeographische Verhaltnisse . . . des sächsischen Erzgebirges, 225 †
Wellcome Research Laboratories at Gordon Memorial College, Khartoum: Third Report: A. Balfour, 616 †
Wellcome's Photographic Exposure Record and Diary, 235 †
Wessmann, R., Bawenda of Spelonken (Transvaal), 730 †
West, J., History of Tasmania, 109 †
Western Sea, Search for the: L. J. Burpee, 316 §
West Indies—
  Grandes Antilles: D. Bellet, 714 §
  Guide to West Indies and Bermudas: F. A. Ober, 231 †, 593 §
  Petites Antilles: P. C. Dupontès, 732 †
Weule, K., Ethnographischen Forschungsreise in den Südösten Deutsch-Ostafrikas, 228 †
Wharton, Sir W. J., and M. Field, Hydrographical Surveying, 733 †
Wheeler, J. T., Zonal-belt hypothesis, a new explanation of cause of ice-ages, 233 †, 712 §
Whitehouse, B., R.G.S. award to, 594, 610
Whitwell, E. R., Through Corsica with a Paint-brush, 100 †, 321 §; Through Bosnia and Hercegovina with a Paint-brush, 713 §, 726 †
Wicklund, K. B., Lapp migrations between Sweden and Norway, 210
Wieser, F. R. von, Karten von Amerika in dem Islario General des Alonso de Santa Cruz, 687 §
Wiesner, J., Lichtgenuss der Pflanzen, 107 †
Wilderness, Witness of the: G. R. Lees, 592 §, 615 †
Williams, G. B., Geographical Distribution of Mean Annual Rainfall of Wales and Monmouthshire, 297 †
Wind—
  Calculation of wind velocity from pressure distribution, Report on: E. Gold, 344 †
Wolkenhauer, W., (biography of) Roald Amundsen, 345 †; Dr. Moritz Lindeman, 511 †
Woodroffe, C. R., Four weeks in Saghalien, 614 †
World—
  Dürer's map of the World, 565
  Leonardo da Vinci's map of, 543
  Maps: Cable Map of World (Geog. Section, General Staff), 737 †; Chart of World on Mercator's Projection: H. Habenicht and B. Domann, 737 †; Chart showing variation of Compass for 1910 (U.S. Hydrog. Office), 351 †; Philips' Comparative Series of Outline Physical Maps, 625 †; Telegraphic Connections of World afforded by Submarine Cables and Principal Overland Telegraphic Lines (U.S. Hydrog. Office), 737 †
  Peregrinacion del mundo: Pedro Cubero, 108 †
Wråk, W., Bidrag till Skandinaviens Reliefkronologi, 726 †
Wrench, E. M., Observations of Effects of Glaciers in Derwent Valley, Derbyshire, 506 †
Wright, G. F., Influence of glacial epoch upon early history of mankind, 345 †
Wright, T., Life of Colonel Fred Burnaby, 345 †, 593 §

X.

Xavier, F. N., Bosquejo historico das communidades das Aldêas dos Concelhos das Ilhas, Salcete e Bardez, 109 †

Y.

YANG-TSE—
Structural geology of middle Yang-tzï-kiang gorges: E. C. Abendanon, 614 †
Yate, C. E., remarks on "Baghdad to Damascus *viâ* El Jauf," 535
Yellow river—
Inundations of the, 678
Irrigation of valley, 672
Yola, rainy season, 701
Young, A. E. (*see also* Wallace, W. A.), Federated Malay States. Report on Trigonometrical and General Survey Dept. for 1906..227 †
Young, E., Rational Geography, 209 §
Yucatan—
Yucatan inconnu: Comte Maurice de Périgny, 731 †
Yunnan—
Mission géologique et minière du Yunnan méridional, Résultats de la: H. Lantenois and others, 614 †
Yün-nan: the link between India and Yangtze: H. R. Davies, 728 †

Z.

ZAHN, G. W. v., Verkehrsgebiet der Hamburg-Amerika Linie und des Norddeutschen Lloyd, 620 †
Zambesi—
Minerals of Zambesia, More about: S. J. Lett, 341 †
Zamora—
Provincia di Zamora y el lago di San Martin de Castañeda: J. de Ciria y Vinent, 727 †
Zeil, G., Contribution à l'étude géologique du Haut-Tonkin, 614 †
Zepelin, C. von, Der ferne Osten, 728 †
Zimmerman, M., Valeur de notre domaine coloniale, 621 †
Zimmermann, O., Durch Busch und Steppe vom Campo bis zum Schari 1892-1902.. 729 †
Zoutpansberg district, Report on reconnaissance of north-west: T. G. Trevor and E. T. Mellor, 341 †
Zugmayer, E., Eine Reise durch Zentralasien im Jahre 1906..101 †, 313 §
Zweck, A., Deutschland, nebst Böhmen und dem Mündungsgebiet des Rheins, 726 †

INDEX TO MAPS.

EUROPE.

British Islands, Sketch-maps illustrating Geographical Conditions affecting: H. J. Mackinder, 464–475
Hampshire, N.-E., near Alton, showing Swallow-holes: W. Pitt, 197
Sicily and Italy, Sketch-map of Parts of, illustrating R. D. Oldham's paper on Earthquake of December, 1908..187
Wales: Map showing distribution of Mean Annual Rainfall: G. B. Williams, 352

ASIA.

Bagdad to Damascus *viâ* El Jauf, Route of S. S. Butler and L. Aylmer from, 628
Malay Peninsula, Sketch-map of Part of, 479
Ordos, Sketch-map of: W. R. Carles, 740
Tibet, Sketch-map of Part of, showing journeys of Dr. Sven Hedin, 1906–08.. 516
Tibet, Southern, sketch-map, 399

AFRICA.

Africa, Eastern Equatorial, showing progress of Exploration. Jubilee of Speke's discovery of Victoria Nyansa, 240
Nile Region, from Map of Africa dated 1749 in D'Anville's General Atlas, 121
Sahara and Western Sudan, Isohyets between, 699
Tripoli to Lake Chad, Sketch-map illustrating Journey of H. Vischer across Sahara from, 352
Victoria Nyanza to Lake Kioga, from Survey b C. E. Fishbourne, 240

AMERICA.

Antilles, Greater, Map of the: Sir H. Johnston, 740
Huasco Lake Region of Chile and Bolivia: I. Bowman, 273
Huasco Lake Region, Trails and Corrals of: I. Bowman, 273
Panama canal, illustrating paper by V. Cornish, 240
Paraná river and its Watershed, Maps illustrating paper by W. S. Barclay, 116

ANTARCTIC.

South Pole, Sketch-map showing Lieut. Shackleton's Route, 487

ARCTIC.

Greenland, North-East, Sketch-map showing Surveys of Danish Expedition, 1906–08..116
North Polar Seas, Bathymetrical Chart of: F. Nansen, 443

GENERAL.

Leonardo da Vinci and Art of Renaissance—
Imola, Plan of, after T. P. Richter, 549
Mappemonde, Northern Hemisphere, after R. H. Major, 542
Milan, Sketch of, after T. P. Richter, 551
Northern and Southern Firmament by A. Dürer, 562, 563
Leonardo da Vinci and Art of Renaissance—*continued.*
Pontine Marshes, Map of, after T. P. Richter, 548
Tuscany, Maps of North-Western and Eastern, after T. P. Richter, 544, 545
World Map by Johannes Stabius and Albrecht Dürer, 1515 A.D., 628

ILLUSTRATIONS AND DIAGRAMS.

EUROPE.

Swallow-holes in chalk—
Sections of holes, 198
Wales and Monmouthshire—
Mean annual rainfall, diagrams, 300, 301

ASIA.

Arabia, Northern—
Ali Ibn Gaarde, one of retainers of Feysul Ibn Rashid, 521
Beduin in the desert, 519
Arabia, Northern—*continued.*
Castle of Feysul Ibn Rashid at El Jauf 527
El Jauf, looking south from Maarid, 523

ASIA.

Arabia, Northern—*continued.*
El Jauf, looking north from old castle at Maarid, 525
Feysul Ibn Rashid and four of his viziers, 529
Maarid, interior of castle at, 531
Tibet—
Bridge over Tsangpo near Pun-tso-ling, 376
Brother and sister-in-law of Tashi-lama, 376
Chang-Chenmo, 370
Tibet—*continued.*
Kailas from south-west, 386
Lake in Central Tibet, 366
Lighten, Lake, On shore of, 366
Mohamed Isa and two Ladaki chiefs, 362
Mountain range in North-East Tibet, 358
Mountain scenery, North-West Tibet, 358
One of our camps, Central Tibet, 362
Shigatse-dsong, 370
Source of Brahmaputra, 382

AFRICA.

Tripoli to Lake Chad—
Beduin sheikh, 261
Camels crossing sand-dune in Fezzan, 249
Depression of Lake Chad: a Budduma canoe, 261
Landscape near Misda, 245
Mountains between Misda and Tabonia, 245
Tripoli to Lake Chad—*continued.*
Salt lake north of Bornu, 257
Sand-dunes south of Wadi Shiati, 253
Underground house at Gharian, 253
Wadi Gerbi, 249
Uganda, Western—
Cave district, Typical view in the, 600

AMERICA.

Amazon—
British S.S. *England* coming alongside temporary dock at Porto Velho, 608
America, South—
Huasco basin, Abandoned trail and corrals of southern edge of, 277
Huasco, Basin of, viewed from western margin, 275
Cuba, etc., Scenery of—
Avenue of royal palms, Cuba, 631
Ayuly lake, Shores of, Haiti, 643
Blue mountains of Jamaica: a tree fern, 663
Cereus cacti, Eastern Cuba, 631
Epiphytes and *aërophytes* growing on a Jamaica tree, 649
Hut of an "Indio" (Cuban of Amerindian race), 637
Jamaica landscape, Typical, 659
Mountains of Haiti, 655
Open market, Haiti, 643
Port au Prince, Haiti, 637
Cuba, etc., Scenery of—*continued.*
Valley of Haitian river, showing white limestone formation in river-bed, 649
Panama Canal in 1908—
Culebra, Cut at, looking north-west, 163
Culebra, Cut at, looking south-east, 163
Gatun locks and dam, looking west, 157
Gatun, Lock site at, looking north, 157
Paraná river—
Argentine Chaco: working out the Quebracho forest, 33
Entre Rios: sandhills of the Rincones, 19
Entre Rios: crossing the Rincones, 15
Iguazú falls, 7
Laguna Ibera, Corrientes, 15
Misiones: the Pinelands, 5
Paraná river from Paraná port, showing shifting island and limestone bluffs, 19
Serra do Mar, Brazil: basalt cliff facing Atlantic, 5

ARCTIC.

Danish N.E Greenland Expedition—
Eskimo meat-cache, 59
Fjord, lat. 77° N., summer, 47
Ice grotto in lat. 77° N., 57
Inland ice, Edge of, lat. 77° N., 53
King Frederick VIII. Land, Typical fjord in interior of, 43
Lake and flowers, lat. 77° N., 57
Summer in North-East Greenland: water rushing down to rivers, 53
Sunshine in pack-ice, 43
North Polar expedition, Proposed—
Current-gauge, Dr. Ekman's, 449
Fiord near Bergen, showing current 3 feet below surface, 450
Nansen-Pettersen water-bottle, 446
Section across North Polar basin and Norwegian sea, 448
Section of North Polar basin, 447
Tidal wave, Progress of, 451

GENERAL.

Speke, Captain John Hanning, Portrait of, in 1862, 117.

END OF VOL. XXXIII.

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13443/R 23